VW'S DIESEL DISASTER

HOW THEY DID IT. WHY THEY DID IT. AND WHAT HAPPENS NEXT. P. 023

CAR AND DRIVER

DECEMBER 2015

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THE ART OF PERFORMANCE

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Overland driving instructor Jack Quinlan in his 1983 ExMod 110 and artist Geoff McFetridge in his 2007 NAS Defender 110 laced up their Clarks Desert Boots, readied their trucks and ventured to the lowest point in North America, Death Valley, to California's highest road in the White Mountains.

A. Jack Quinlan (left) and Geoff McFetridge (right) peer out of the Badwater Salt Flats. The temperature hovered at 118°f.

B. Geoff lets the pressure down in his tires as the road becomes rougher.

C. Dust flies as Jack and Geoff make their descent from the top point of the White Mountains, at the Barcroft Field Station.





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A

THE ORIGINAL DESERT BOOT STORY

1949

INSPIRED BY CREPE-SOLED BOOTS FROM CAIRO'S FABLED OLD BAZAAR, **NATHAN CLARK** DESIGNS THE ORIGINAL DESERT BOOT – THE CLARKS DESERT BOOT.

1950

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2015

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GEOFF IS WEARING THE MEN'S DESERT BOOT IN BLACK SUEDE. JACK IS WEARING THE MEN'S DESERT BOOT IN OAKWOOD SUEDE.



PHOTOGRAPY BY SINUHE XAVIER

C

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GAMING COULDN'T CONTAIN HIM. RACING CAN'T KEEP UP.

By winning GT Academy season 1, Bryan Heitkotter went from gamer to amateur driver for Nissan. Now he's leveled up once again – this time on a real track. With his second top-five finish overall in the 2015 Pirelli World Challenge, Bryan and his GT-R® NISMO® GT3 have broken away from the amateurs to race with the GT pros. For something he's always considered a dream job, this is quite the promotion. The other racers always joked they could never take a gamer seriously. Now when Bryan spies the competition in the rearview mirror, he's the only one laughing.

NissanUSA.com/GTAcademy

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THE TALE OF THE ALL-NEW

2016 MALIBU

AS TOLD FROM AN ENGINEERING AND DESIGN PERSPECTIVE.

We sat down with designers Mike Pevovar and Crystal Windham, and integration manager Lance Johnstone to talk about the innovation that went into developing the next-generation Malibu.

Malibu Premier with 2.0L engine offers a GM estimated 32 MPG highway. Official EPA estimates not yet available.





MIKE PEVOVAR & CRYSTAL WINDHAM

GM EXTERIOR AND INTERIOR DESIGN DIRECTORS

In terms of design, what are some defining features of the all-new Malibu?

Mike: The Chevrolet Malibu has a road presence that balances form and function in a way that will turn heads. When creating the "new face of Chevy," the grille, headlamps and daytime running lamps all laid the foundation for the expressive, windswept body lines. The design is assertive and confident, as emphasized by its solidly planted stance. Long, dramatically sweeping surfaces really make Malibu stand out from the crowd. The whole vehicle feels tidy and taut — something you could throw around a little.

Crystal: Malibu interior design is all about maximizing comfort with style. The instrument panel is down and away for more driver space, but the available touch-screen is up to 8 inches. We offset and slightly floated the screen to use space better. That's pretty daring for this market, but glare and reach are optimized for a driver. Also, the softest materials are closest to the customers, and the details are outstanding — lots of inserts and accents of different textured leather appointments, intricate stitching — it's taking those expressive zones and adding more. We want to surprise people, not just the first time, but the second time, third time — like, "Wow ... they have this little pocket here for my umbrella!" and "Wow ... so this is what my car looks like at night!"

How do interior and exterior design elements of the all-new Malibu complement each other?

Mike: The extra 1.3 inches of rear leg room set the stage for exterior design — it stretched everything, so we used that to set up body proportions to make the vehicle look lower, longer and wider. Also, the sixth rear quarter panel window not only increases visibility and brings more sunlight inside, it helps make the car look lighter, more airy and more spacious from the outside.

Crystal: When you start with a solid exterior foundation with correct proportions, the interior design architecture comes together naturally, and we can focus on improving visibility and comfort. I always say the exterior draws you in, but the interior keeps you there. Drivers spend so much time in their car, so it should feel like a second home.

> *"We want to surprise people, not just the first time, but the second time, third time..."*
>
> *Crystal Windham,* INTERIOR DESIGN DIRECTOR



LANCE JOHNSTONE

GM VIRTUAL PERFORMANCE INTEGRATION MANAGER

The 2016 Malibu is quieter, offers improved mileage and better handling. How could you improve Malibu on so many dimensions simultaneously?

The key is integration — working with all of the vehicle components and vehicle teams simultaneously to create the lightest, best performing structure for the vehicle. The ultimate goal was to design Malibu with surprising MPG with less mass, but no reduction in performance. Integration allowed us to work through all of the consequences of using one part or another, and combining components. It allowed us to optimize more and compromise less, and it really paid off in the all-new Malibu. We were able to remove nearly 300 pounds from the vehicle — making it the lightest vehicle in its class, all the while offering an estimated 37 MPG highway.[1]

What technologies aided in optimizing vehicle integration with the Malibu design team?

Computer-assisted engineering has progressed to the point where it allowed us to explore and virtually evaluate more design alternatives for the new Malibu than ever before. This gave us new insights by showing us how these alternative designs for the vehicle structure could improve performance across numerous different vehicle-performance dimensions. These internal structural improvements then paved the way for new external design considerations and possibilities. The engineering improvements optimized performance and mass, enabling MPG and also had an impact on the exterior's great design.

CHEVROLET
FIND NEW ROADS™

1 With 1.5L engine. Based on GM testing. Official EPA estimates not yet available.

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NEXT MONTH: OUR ANNUAL 10BEST CARS ISSUE
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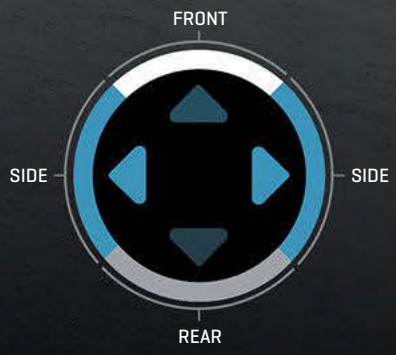
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COPING WITH LOSS

Your September issue's cover states, "We have full details on every make and model." Yet, I could not find a single word about the Chevy SS. I just purchased one six weeks ago from my local Chevy dealer (six-speed stick), and I was led to believe that it still will be sold for a few more years. Or did I somehow miss it?

BRUCE NYQUIST
MARQUETTE, MICHIGAN

You forgot to mention the Chevy SS in your 2016 New Cars issue.

SETH BIELEFELD
SOLOMON, KANSAS

As a (very satisfied) Pontiac G8 GXP owner, I couldn't help but notice that your "New Cars for 2016" did not mention the status of the Chevy SS for 2016. These sister sedans have received near-universal critical acclaim and win comparison tests but then fall back into obscurity. What gives? Any changes to send off this sedan since production for the U.S. ends by 2017?

CHRIS SUMEY
SIOUX FALLS, SOUTH DAKOTA

All car production in Australia, where the Chevy SS is built, ends in 2017. For the 2016 and presumably last model year, Chevrolet implemented some minor color changes, a dual-mode exhaust system, and LED lighting revisions—Ed.

GRILLING A CADILLAC

Regarding the "screaming" Cadillac CTS-V on page 48 ["Velociraptor," September 2015] and the Kia Sorento on page 72: Seriously? Did Cadillac get the front end for the CTS-V off the Sorento? No wonder nobody will buy it.

By the way, since I assume no one who reads *C/D* owns a Sorento, no one will understand the comparison, and their wives will have recycled the September issue so they can't look it up. I hate letters like this that expect readers to have memorized all the photos appearing in the past several issues.

ALEX TANFORD
BLOOMINGTON, INDIANA

Annoyed reader annoys self. Well played—Ed.

AGAINST THE WIND

Your Ferrari 488GTB review was a downer ["Blown Out," September 2015]. The demise of the manual trans in the 458 seems now to have been only the first in a series of moves toward prioritizing spec-sheet numbers over experience. Yes, paddles are faster than a manual but are less engaging. And now the 488 is faster, but once again specs drove an update that is less beautiful, less aural, and less engaging than the 458, and that makes me sad.

BOB NOCERA
ATLANTA, GEORGIA

Every month a new issue arrives, and every month there's at least one letter about reviewing expensive cars and yet nothing changes. [***Here's this month's—Ed.***] It physically pains me to read about these great vehicles—Ferrari 488GTB—that I will never be able to afford. Therefore, I am forced to implement a workaround. From now on I will archive my issues without reading them for four years. That way, the cars featured in each issue will have depreciated into the realm of possibility. I look forward to reading Ed.'s snappy reply in September 2019.

ALLON BLOCH
BERWYN, PENNSYLVANIA

This response will be funny in 2019—Ed.

MUD HONEY

Seriously, folks: Referring to the Fiat 500X as having "the look of an embryonic Porsche Macan" is a farce and a demented stretch ["Mudskippers," September 2015]. After just returning



Page 50 in the September issue. Why ruin a perfect photo?

LEN SEPPANEN
LAKE NORDEN, SOUTH DAKOTA

Nice, Seppanen. You and Tanford plan this? Here's the unbroken pic—Ed.



ILLUSTRATIONS BY BRETT AFFRUNTI, CADILLAC PHOTOGRAPH BY A.J. MUELLER

from Tuscany where these things have multiplied like flies and are foisted on you by the rental companies, "like a Macan" is the furthest thing from the truth. I turned it down after one look at the bloated, goofy body—while maintaining control of my lunch—and insisted on an Audi A5 convertible. The 17 days were spent gleefully passing each and every Fiat.

JAMES TIMBERLAKE
PHILADELPHIA, PENNSYLVANIA

I have to ask Jared Gall how larger wheels (from 16 inches to 18) are going to improve the braking performance of the Mazda CX-3? "[I]t needed 181 feet to stop from 70 mph . . . 18-inchers might improve that number." Is Gall actually a car guy? I guess a set of 22s would make it stop in 100 feet, plus it would look so cool when he drives by the junior high school to wave at the chicks.

BOB LESEBERG
WALNUTPORT, PENNSYLVANIA

We'll ignore that creepy fantasy and inform you that the 18-inch wheels come with grippier V-rated tires, which will likely shorten braking distances—Ed.

I really like the idea of having a comprehensive review of the new and current cute-utes, the kind of little SUV that most anybody can afford and enjoy guilt-free. When I saw the comparison of "Mudskippers" in the September issue, I thought, ah good, an article I can use instead of just another pretty supercar to ogle over. Seemed that there were a couple of glaring omissions in this very popular, growing category, and quite frankly, I have no idea why the Kia Soul was even given a slot in the lineup. So why no Mitsubishi Outlander Sport and no Subaru XV Crosstrek? How could these two very popular and competitive players not be included in the lineup, and just how well would each of these cute-utes do when pushed to their limits in an off-road-ish environment or during inclement weather?

CHRISTOPHER HARPER
PITTSBURGH, PENNSYLVANIA

The Impreza-based Crosstrek was deemed too large to compete in this class. And what's up with all the letters from Pennsylvania this month?—Ed.

. editor's letter

I'm probably out here all alone on this one, but I believe that the most important car redesign of the decade, now that we're midway through it, is the current Mercedes-Benz S-class sedan's.

I take little pleasure in claiming credit for this—let's admit—staggeringly brilliant observation. I take equally little pleasure in the incrementalism of the car's new form, pretty as it is. No more leaping from stylistic peak to peak, from W116 to W126 to W140, as was Mercedes' wont long ago; today's big Benz barely seems different than the car it replaced. It essentially carried over its powertrains and suspension hardware. It has the same wheelbase as its predecessor, casting virtually the same shadow on the ground.

It's what's inside that counts now. Mercedes-Benz apparently spent all its S-class–development dollars on a bunch of electronic-assist functions that I can't figure out how or why to use, then covered them in a set of materials and shapes so lovely that it's impossible not to be seduced.

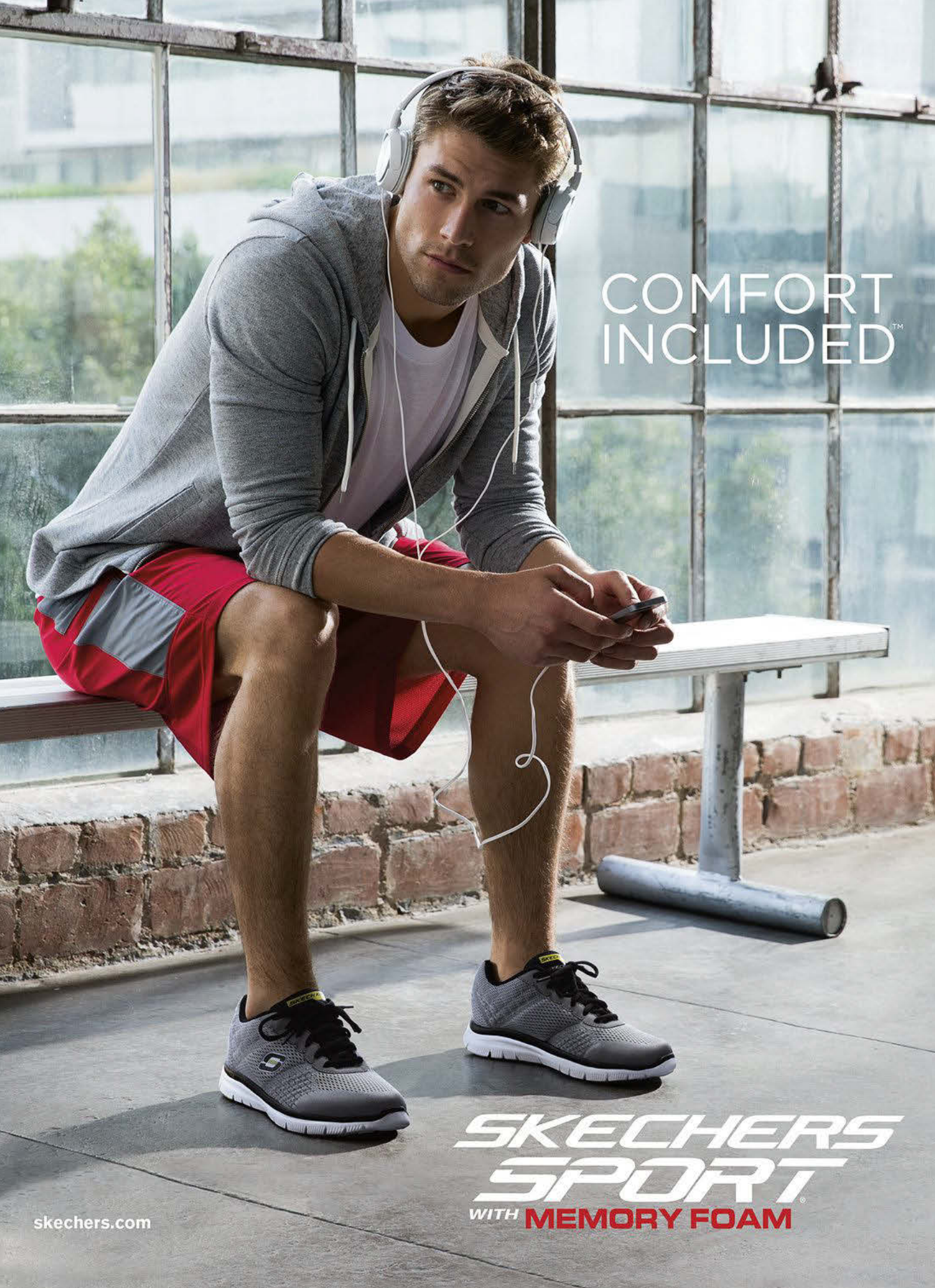
Do not let the foul demons of lust sway your good sense. This is all a feint, the sugar that makes the medicine go down, and it's not unique to the S-class. The all-new, carbon-fiber-intensive BMW 7-series [see page 056] looks like a mere mid-cycle refresh of the old car. But get inside, and there's leather quilting that encourages frottage; gesture controls to ease the rigors of tuning the stereo; and creeping semi-autonomy. See also the Audi TT, once a paragon of exterior expressiveness—now what? By the looks of it, pretty much the old car with a nifty video game where the gauges should go. And more stay-put "redesigns" are to come.

I'm a champion of automotive progress. I have a patch on my jean jacket that says so, so it's pretty much useless to argue the point. But this is not the march of progress, comrades; this is the march of software, invading the car and stunting its growth. Are we content to live with the shapes and mechanicals currently on the road, maintained and updated with often imperceptible tweaks, until the Singularity arrives? Are we going to let our interiors swallow us up and operate our cars for us? Or are we going to fight the power and buy nothing but Lotuses?



None seems like a great option. Lotus does not make the large, gluttonous GTs that I favor, for one thing. But it's not clear how we get off this path. In 20 years we're going to look back at that barely restyled S-class and call it the beginning of the end.

Eddie Alterman
EDITOR-IN-CHIEF


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CIRCUS MAXIMUS

Exactly how old is Tony Quiroga? Nine years old maybe? Seven?

I'm interested in learning about the 2016 Nissan Maxima, so I read both pages of his review ["Quiet Storm," September 2015]. If the immaturity, anger, poor writing, and mindless focus on the 4DSC label were edited out of the article, you would have had another page and a half of valuable space in your magazine. Floor-mat ads would be more informative.

MICHAEL S. DERSCH
KINNELON, NEW JERSEY

About the new 2016 Nissan Maxima, I have three words to say: Bavarian Motor Works. Game over.

NEIL LOCKWOOD
HUNTERSVILLE, NORTH CAROLINA

IT'S A GAS

I understand that the new Toyota Mirai is a big deal ["Cell Mate," September 2015], the first for-sale fuel-cell car. However, why does it have to be so incredibly ugly? Yikes! It looks like something the Griswold family would use for one of their family vacations!

KEN BAGENSTOSE JR.
TEMPLE, PENNSYLVANIA

This letter isn't the least bit amusing. I'm only running it because it came from Pennsylvania—Ed.

SURVEY SAYS

The only thing painful in trying to complete your New Rules of Car Buying survey [September 2015] is that you eliminated all Canadian readers as the ZIP code wouldn't handle the Canadian codes, and you couldn't skip it to move to the next page. Come on, guys.

JAMIE GRAHAM
VICTORIA, BRITISH COLUMBIA

We'll get after our programmers in Bangalore—Ed.

Boohoo. Your car-buying survey is not available to Canadian subscribers. In light of what you are offering in return, I would have loved to add my two cents' worth.

PETER HOFFMAN
TORONTO, ONTARIO

That's worth about a U.S. penny, eh?—Ed.

ROAD TO CONFUSION

Could you SHUT IT? There is a reason Knoxville, Tennessee, is so wonderful ["The Roads to Nirvana," September 2015]. You don't tell the world about your secret fishin' hole, do you? You keep it to yourself. You wouldn't like it here anyway. We're just a bunch of shoeless, backward mountain folk clinging to our God and our guns. Nothing to see here.

GREG MURRELL
KNOXVILLE, TENNESSEE

Your chart in "The Roads to Nirvana" has good-for-driving metro areas color-coded in red and bad-for-driving metro areas color-coded in green? Or am I mistaken? Please reprint with conventional good/bad color-coding!

ALAN
ARLINGTON, VIRGINIA

The "Roads to Nirvana" in the September issue may have been lacking a critical factor: morons per square foot of linear roadway. Had this been included, I'm sure that the very high ranking of the area I live in would have plummeted drastically. Yes, while I can access incredible driving roads in a very short time frame, said incredible driving roads are cluttered with drunks, dumbasses, outta-state tourists (usually drunk from visiting all the trendy with-it wineries), males in pickup trucks, etc. Factor in that our glorious leaders—who, of course are sooo much smarter than the taxpayers—have "diverted" highway funds to buy votes via "social justice/income redistribution" schemes, and said incredible roads are not so incredible.

So, the map is not that accurate when it comes to being able to enjoy what used to be great roads in this area.

MIKE MARTIN
SONOMA, CALIFORNIA

This has got to be the most confounding and arcane set of graphics ever presented, comparable to "Cat versus rodent ratios during times of drought in the Dakota Badlands." Near as I can tell—and I'm still shaky on this—red means "good" and green means "bad"? Well, then I must change the color on my oil-pressure warning light. And the roads in Los Angeles are friendlier than those in Utah? Who knew? And thanks for not inserting one of those annoying "key to symbols" charts.

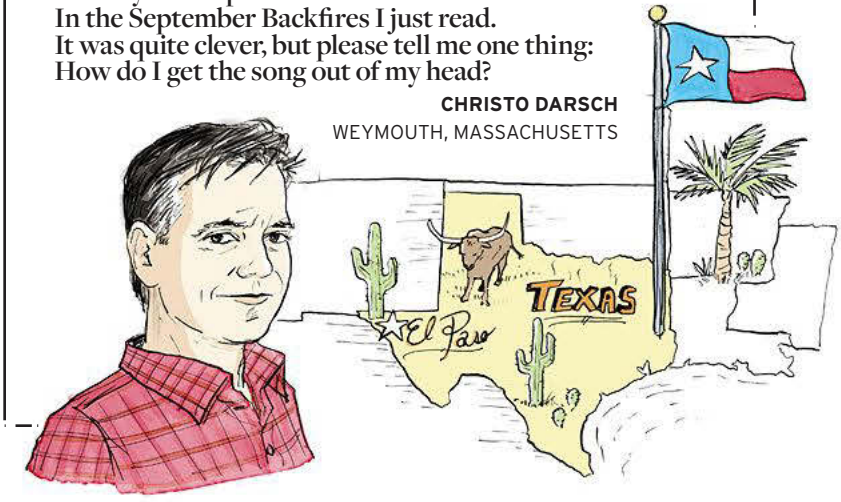
JOE TROISE
SONOMA, CALIFORNIA

Another fine example of how you often seem to outdo yourself in graph complexity. Still wondering where Chicago ranks. How about a list or reference of the most challenging roads you are using in the data? All the stories

LETTER OF THE MONTH

Loved your response to Tom B. from El Paso
In the September Backfires I just read.
It was quite clever, but please tell me one thing:
How do I get the song out of my head?

CHRISTO DARSCH
WEYMOUTH, MASSACHUSETTS



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I hear about Los Angeles gridlock and it came in second? Is that good or bad? Red means stop and green means go, and yet the opposite is intended here? High numerical road-score number is good and low numerical rank is good? Is it the PCH that qualifies the three California cities for the (I'm guessing) high ranking?

RICH KUBAN
ITASCA, ILLINOIS

I still can't figure out if a low score or a high score is good or bad. What scale is used for the "road score"? Please don't do anything like this to your readers again. Your graphs have suffered from incomprehensibility for far too long.

GLENN WINKEY
SPOKANE, WASHINGTON

I noticed a couple of pages titled "The Roads to Nirvana." There were, like, words and numbers and lots of pretty colored circles. Thanks for that.

BO RING
DEVON, PENNSYLVANIA

DROPPING OFF

Let me be among the many who will offer these corrections to technical (not military) editor Eric Tingwall's September article ["Dropping Democracy"]:

1) The United States Army does not routinely airdrop vehicles. The United States Air Force, however, does.

2) The Army hasn't dropped vehicles in major combat operations since 1944's Operation Market Garden (when the Air Force was part of the Army). And even those weren't dropped; rather they were delivered inside of gliders.

REX MILLER, MAJOR, USAF (RET.)
LEESBURG, VIRGINIA

UNTIL YOUR DREAMS COME TRUE

I was reading your fine magazine, as I have done for my entire adult life, when I came upon the article about the study of aerodynamics titled "Aerosmithing" [September 2015].

I was puzzled and delighted at the same time as I wondered about the possible connection between that word and the name of my band. I think just for the fun of it, I'm going to conclude that the writer and/or the editor had us in mind when the title came to be. Maybe now we'll make it into the dictionary!

TOM HAMILTON, AEROSMITH
SHERMAN OAKS, CALIFORNIA

Dream on—Ed.

FLINGING IT

I just finished reading John Phillips's column ["The Yin and Yang of Fling and Flung"] from the September 2015 issue. Occasionally your readers complain about Phillips. They deserve to be flung into the pond. Please do what you can to keep him writing columns for as long as you possibly can. He is a remarkable

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writer, and a few times every year his work is absolutely brilliant.

JAMES PARSEKIAN
MORRISTOWN, NEW JERSEY

Give the man a five-year contract, with a raise. Phillips captured frustration perfectly. Haven't laughed and felt so good since I flung my recalcitrant DVD player off the balcony onto the concrete below.

ED SHAW
KEY WEST, FLORIDA

Like John Phillips, I too come from a line of men who punished inanimate objects. My uncle Raymond was trying to start his stubborn Tin Lizzie one day. After many adjustments of spark, throttle, and choke, with ensuing engine spins with the crank, my frustrated uncle heaved the crank through the windshield and said, "Now damn you, PURRR!"

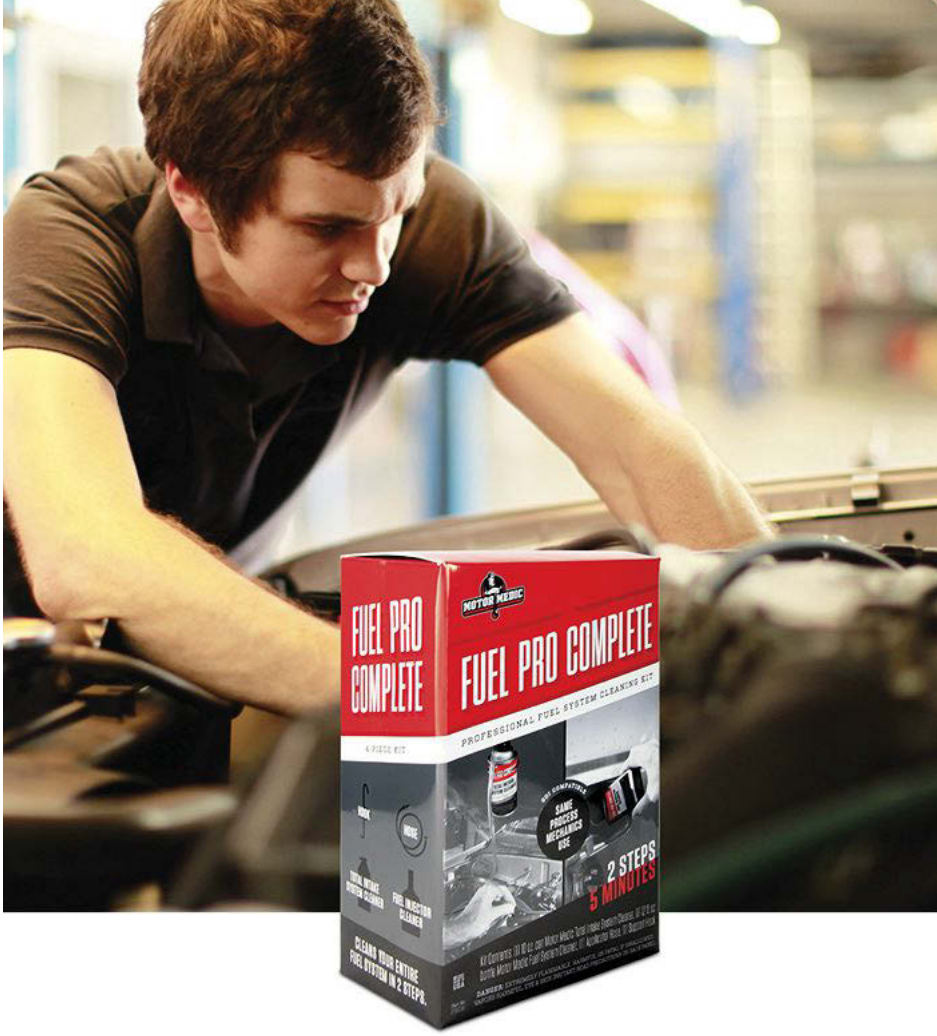
NORM HARRUFF
GALVESTON, INDIANA

Brilliant writing! Phillips precisely captures the visceral satisfaction of flung items. He brings back memories of the perfectly, beautifully honed Chinese vegetable cleaver with the new, giant dent in the blade because my wife tried chopping a steak bone with the dang thing. It was last seen hurling through the backyard, tomahawk style. Sadly, it did not impale a tree but merely disappeared into the woods.

DENIS WOLOWIECKI
CHARLOTTE, NORTH CAROLINA

PILE ONS

Aaron Robinson's column was right on ["Traffic Tickets Have Become a Tax-hack Pile-on," September 2015]. It also applies to many facets of government squeezing the law-abiding middle class for more money. As an example, my



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fiancée ran into financial difficulties in 2012 and was unable to continue paying her student loans. She applied for a loan consolidation under the FedLoan Servicing program and received the official paperwork showing she owes $13,208.10 (precisely to the penny) for $3750 borrowed in 2007 at 6.8 percent interest. Since Uncle Sam has the power to take her income-tax refund and has made these loans exempt from bankruptcy protection, you have no recourse if you want good credit or want to go back to school. Meanwhile, the daily interest accumulation marches on. For traffic tickets, pay up or drive without a driver's license—may as well stop paying for auto insurance, too. Use the money saved to pay your student loans!

MIKE DUNN
ORMOND BEACH, FLORIDA



THE SIZE OF THE FIGHT IN THE DOG

I'm concerned about 2.0-liter four-cylinder engines pushing 2.5 tons to 60 mph in 6.4 seconds ["How Swede It Is," September 2015]. Will the XC90 make it to 100,000 miles? Any manufacturing flaw will quickly become death. I saw this engine at the New York auto show two years ago. I wanted to grab everyone around to show off this little marvel. Volvo didn't do much to present it. It is very small. That they are extracting 316 horsepower from a block that is smaller than my '64 Triumph TR4's gives me great pause. One stressed little engine; $60,000, $10/quart Mobil 1, 20.3 psi. It doesn't add up.

ROGER SIMON
QUEENS, NEW YORK

I found it quite interesting to learn from Robinson's column where states are funneling extra fees on traffic tickets. At the end, though, he praises Governor Jerry Brown for vetoing a $1 surcharge for spinal-column research, saying that he wants more people "back on the road legally . . . paying their taxes fair and square." What a crock! We Californians are the highest-taxed state in the country, but that's not enough. Governor Brown recently presented a plan to raise taxes once again, this time so the roads can be improved, among other things. I guess that $0.50-a-gallon state tax on gas isn't enough to pay for our pothole-filled roads.

JOEL GROVES
SIMI VALLEY, CALIFORNIA

WEST TEXAS TOWNS

Having just weeks ago attended the last hurrah for the Dead at Soldier Field, I definitely turned a wry, wistful smile for Ed's shoutout to the west Texas town of El Paso [Backfires, September 2015]. Thank you for confirming that I am not the only 'head that loves cars and quality prose (if not slightly forced rhymes).

JASON CHOCHOLA
CHICAGO, ILLINOIS

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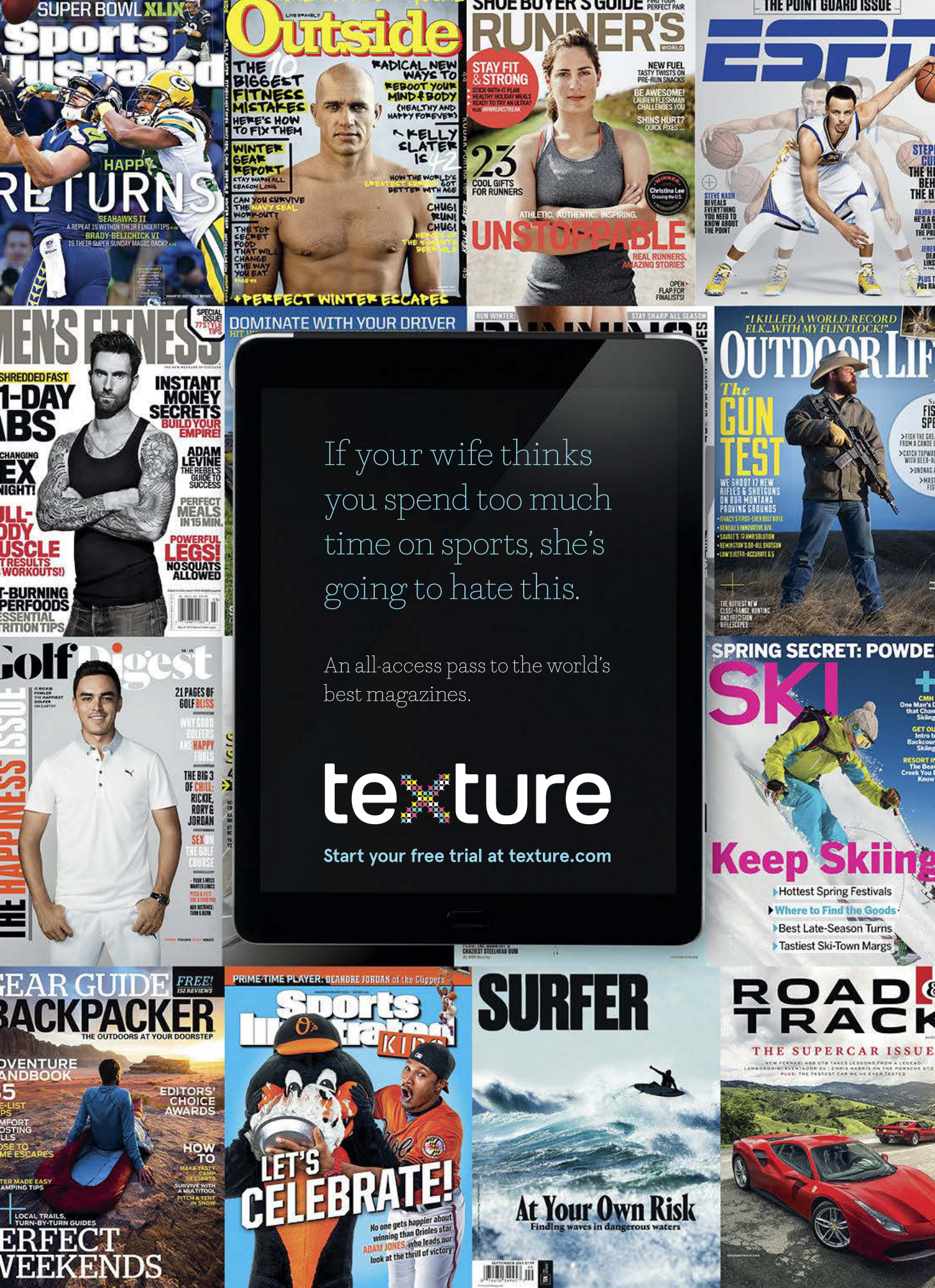


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Caught Black-Handed

WHY DID VOLKSWAGEN CHEAT?

by Aaron Robinson



IT'S AMUSING to watch the mainstream press sink its fangs into an auto scandal. Business-page reporters hurriedly scan the releases and the statements—quickly now, the home page needs updating every 17 seconds—and distill a basic, highly superficial narrative. Press agents for experts in all manner of non-automotive subjects, from business ethics to crisis management to consumer advocacy, flood the email inboxes of the news outlets, their clients desperate for the exposure that comes from getting a rote observation into quotes. The flames of public outrage get fanned for a few days with hyperbolic and often-inaccurate punditry.

Granted, Volkswagen's diesel doomsday is not a simple story, rife as it is with technical inside-baseball. Basically, VW programmed an algorithmic routine into the controllers of its model-year 2009–2015 2.0-liter turbo-diesel engines that recognized the protocols of the EPA's FTP-75 test, including the US06 and SC03 cycles, and altered the engine calibrations to selectively reduce oxides of nitrogen to make the engine compliant with U.S. EPA Tier 2, Bin 5 limits, all in violation of sections 203(a)(3)(B) and 203(a)(1) of the Clean Air Act.

Got it?

Legions of TDI owners who thought they bought a "Clean Diesel" (in spite of the slip-slap sound of the stinky, carbon-rich fuel going into their tanks) howled in indignation. Were they victims of a greedy corporate evil, or of ordinary people in the trenches trying to wriggle out of a difficult spot? Here's a theory on why a carmaker that seemed to have the world conquered made such a heinously bad, unethical, and trust-eroding decision that equally battered both its reputation and its market value.

While other automakers pursued hybrids and electric cars, VW long ago bet its green-tech chips on diesels. The decision was emblematic of VW's prioritization of Europe, where diesels are popular, over diesel-averse North America, a market the carmaker has traditionally dismissed as secondary. The pressure on VW engineers to deliver a clean diesel, or one delivering both good fuel economy and low emissions, was titanic, but the effort ran headlong into U.S. regulations.

The decision to cheat must have happened sometime before 2009, two years after the EPA's Tier 2 emissions standards were in full effect. Tier 2 sets extremely difficult requirements for diesels, cutting allowable oxides of nitrogen by 83 percent over Tier 1 regs, to 0.07 gram per mile (fleet average). NO and NO_2 (NO_X), the strange chemical compounds formed by the high temperature and pressure of an internal-combustion engine, especially diesels, contribute to ground-level ozone, or smog. Tier 2 established by far the toughest NO_X standard in the world.

It came at a bad time for VW. The most effective technology to cut NO_X is called selective catalytic reduction (SCR), which involves spritzing small amounts of urea and water into the exhaust stream to facilitate the breakdown of NO_X into nitrogen and carbon dioxide. The problem is that SCR requires a tank, a pump, and plumbing—not easy things to package on a small vehicle platform such as the PQ35, the aging component set comprising the fifth-generation Golf and Jetta.

There's more to putting a urea tank on a car than just lashing it down with zip ties. The floorpan will likely change, the addition of a secondary filler can mean retooling a quarter-panel, and the reengineered car has to go through full crash certification. Golf V owners liked their multilink rear suspensions, a feature that probably would have to be scrapped in favor of a more compact

PHOTOGRAPH BY SEAN GALLUP/GETTY IMAGES

illustration by **SEAN McCABE**

torsion beam to leave room for the tank. (The larger Passat got a urea system in 2012, but VW programmed it so that, apart from the emissions test, it would be stingier with the urea injections, meaning that the owner wouldn't be inconvenienced with refilling the tank as often.)

With Tier 2 looming, VW faced spending millions on an aging product to make its diesel engines legal in the U.S., one of the smallest diesel-passenger-car markets in the world. In 2007, diesel passenger cars represented only about 0.2 percent of the American market. Factor in the contemporaneous collapse of the world economy and the plunge in U.S. vehicle sales, and VW's engineers were painted into a corner.

But a new, totally compliant Jetta TDI appeared as a 2009 model. Its supposed silver bullet was an underfloor NO_x trap, in which NO_x is captured, then converted to nitrogen and carbon dioxide via occasional spurts of diesel fuel. Maybe it didn't work quite as well as SCR, but it was a lot easier and cheaper to retrofit. And there didn't seem to be a fuel-economy penalty. The companion 2010 Golf TDI advertised stellar city and highway figures of 30 and 41–42 mpg (depending on the transmission), and owners in forums claimed even higher mileage. What nobody knew then was that the engine was programmed to squirt less fuel into the exhaust when the car was off the test dyno, allowing more NO_x out of the tailpipe and raising mileage.

Given the choice of reducing the global problem of CO_2 or the local problem of smog, VW's engineers chose a middle path with a cheat that would give U.S. regulators the low NO_x they demanded and TDI buyers the high mileage they wanted. As it happened, the fudge would only be needed for six years, until 2014, when Europe, the market that dominates VW's decision-making, implemented its own tough NO_x standards with the so-called Euro 6 regs. By then, the engineers may have figured, VW could phase in better NO_x-eating technology through normal platform updating. Why VW continued to include the software cheat in engines built in 2014 and afterward is anyone's guess.

The perpetrators likely believed they wouldn't be caught, as self-certification is the norm under the EPA, which is too cash-strapped to test but 15 percent of the powertrains on the market and is perennially threatened with extinction by Congress. (Independent researchers discovered the ploy.) And if they were caught, VW probably figured, the penalty and market fallout would be small. Perhaps it was an easy choice to cheat. The European competitive environment is rife with deception. Just look at FIFA soccer, where officials are under indictment by U.S. prosecutors. Europeans have a win-by-any-means streak that sometimes emerges under intense pressure. There certainly was pressure. Then-CEO Martin Winterkorn, who took over Volkswagen AG in 2007 determined to make VW the world leader in volume and profit, ordered his staff to deliver a clean diesel that could be sold worldwide and could carry VW's diesel religion to the New World to convert nonbelievers. And they did deliver. Did Winterkorn know the details? Maybe he didn't want to. He has denied any knowledge of the deceit.

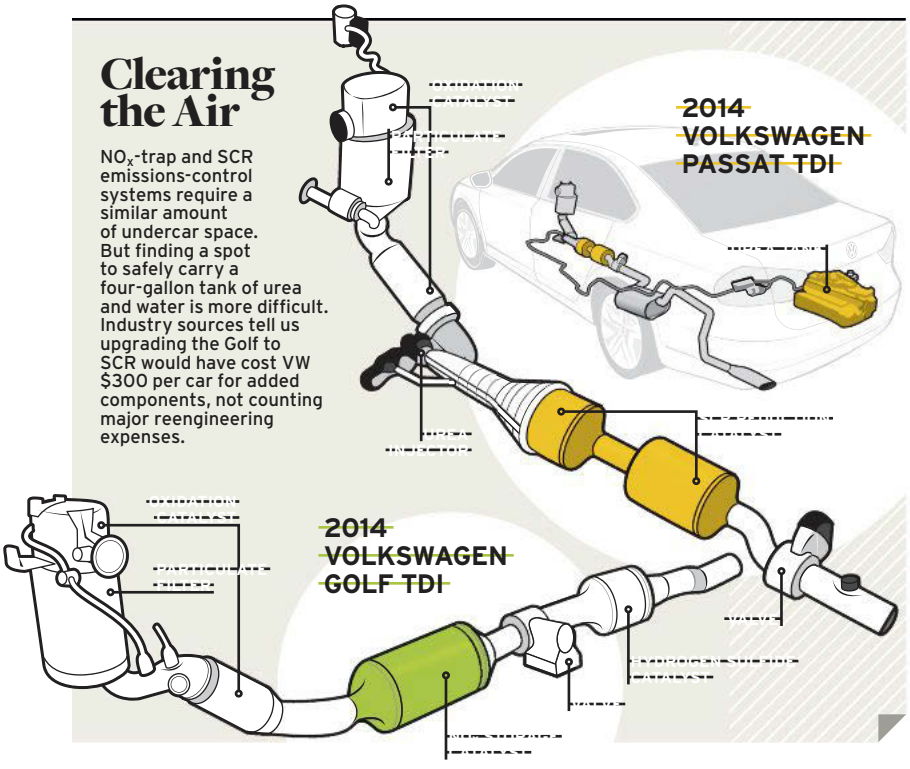
From a moral and legal standpoint, the fraud was a colossally bad decision. Whether it was a bad financial decision remains to be seen. A half-million cheater diesels were sold in the U.S., with 11 million sold worldwide. Meanwhile, the costs of the scam will take years to measure. It took four years for the federal government to slap a $1.2 billion penalty on Toyota for hiding evidence in its sudden-acceleration investigation, so it'll be a while before we know how many pounds of VW's flesh are in play. It almost certainly will be a fraction of the $18 billion widely speculated upon in the press. The rules allow Uncle Sam a lot of wiggle room. This was an emissions issue, after all, not a safety defect involving crashes and fatalities. If you look at the settlement pattern—$935 million for GM, $1.2 billion for Toyota—the fines tend to be starkly punitive but not crushing. Then again, European regulators will likely demand something and there will be civil suits to settle.

Once all the shouting is over, VW's decision to break the rules may prove hugely damaging, a shattering of its recent momentum that distracts and dispirits the company, opens a crack in its armor for competitors, and scuttles demand for the diesel technology upon which VW has staked so much. Or it might just be a break-even, forcing both VW and government regulators into some uncomfortable but necessary changes while being a financial wash against the sales it generated. Or it may even prove to have saved the company some money over the alternatives available to the engineers at the time.

Only VW's accountants will ever know the whole truth.

Clearing the Air

NO_x-trap and SCR emissions-control systems require a similar amount of undercar space. But finding a spot to safely carry a four-gallon tank of urea and water is more difficult. Industry sources tell us upgrading the Golf to SCR would have cost VW $300 per car for added components, not counting major reengineering expenses.



ILLUSTRATIONS BY PETE SUCHESKI

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PARSING THE PENINSULA'S AUCTION TOTALS.

by Jeff Sabatini

THE COLLECTOR-CAR AUCTIONS around the Pebble Beach concours are often described as a barometer of the hobby. Which makes us realize we don't actually know how to read a barometer. But we do know old cars, and we know Microsoft Excel. So we've collated sales from Bonhams, Gooding & Company, Mecum, RM Sotheby's, and Russo and Steele, companies that publish their results.

In less than one week this past August, those auction houses sold 824 cars for a total of $390 million on the Monterey Peninsula. To put that astronomical number into perspective, it's greater than the gross domestic product of a half-dozen island nations listed in a recent Congressional Research Service report on offshore tax havens. But there are a number of interesting facts to be teased from those monstrous totals. While peninsula prices are optimistic, they do tend to indicate where the market is headed. Like the weather, values, both monetary and non-monetary, often start in the west and blow eastward across the country.

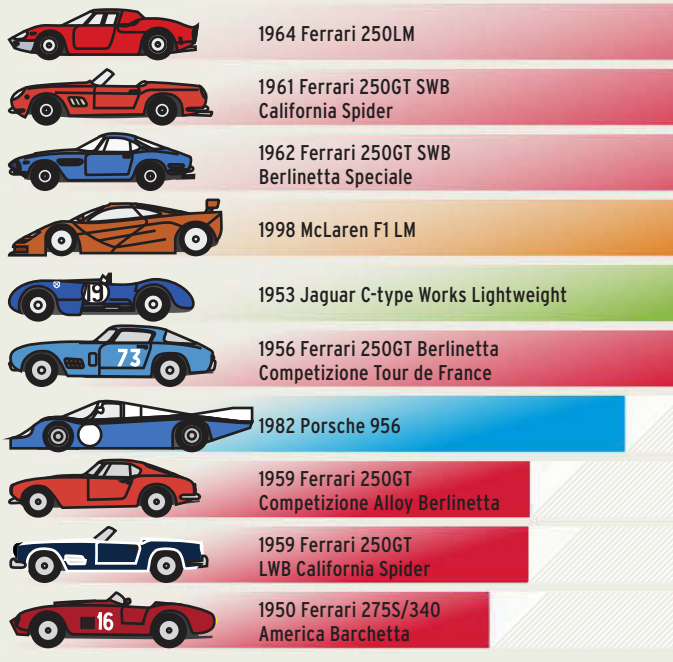
THE TOP 10 SINGLES

(including transaction fees)

Ferrari dominated the top 40 list with 24 cars versus three Porsches and McLarens, two Jaguars and Lamborghinis, and one each Bentley, Bugatti, Lancia, Maserati, Packard, and Plymouth.

Top 10 total: $126.2 MILLION

Share of total sales: 32%



Popularity Contest

BESTSELLING MAKES

1. PORSCHE	102
2. CHEVROLET	101
3. FERRARI	96
4. FORD	69
5. MERCEDES-BENZ	64
6. JAGUAR	39
7. SHELBY	20
8. LAMBORGHINI	19
9. ASTON MARTIN	16
ROLLS-ROYCE	16
BMW	16

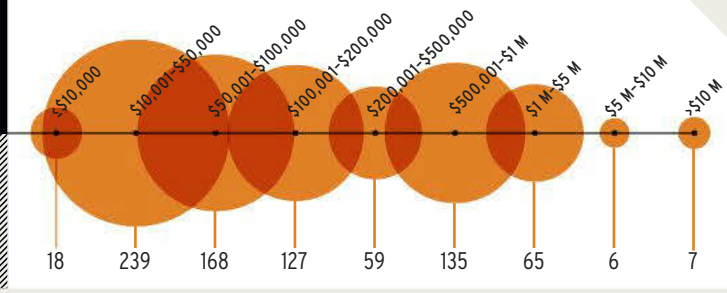
BESTSELLING MODELS

1. PORSCHE 911	64
2. CHEVROLET CORVETTE	59
3. MERCEDES-BENZ SL	36
4. FORD MUSTANG	29
5. JAGUAR E-TYPE	19
6. FERRARI 250	15
7. PORSCHE 356	14
8. TOYOTA LAND CRUISER	11
9. SHELBY COBRA	10
10. FORD THUNDERBIRD	8

Top Earners

MARKET SHARE	SALES TOTALS ($200 M)	NUMBER SOLD (100)	MEDIAN SALE PRICE ($2 M)
1. FERRARI: 44%	$171,750,050	96	$451,000
2. PORSCHE: 11%	$44,578,650	102	$173,000
3. JAGUAR: 6%	$21,895,450	39	$165,000
4. McLAREN: 5%	$17,798,000	4	$1,952,500
5. MERCEDES-BENZ: 4%	$15,675,620	64	$100,460
6. LAMBORGHINI: 3%	$13,084,500	19	$385,000
7. ASTON MARTIN: 2%	$8,557,450	16	$544,500
8. BENTLEY: 2%	$8,427,500	10	$288,750
9. MASERATI: 2%	$7,881,500	13	$295,000
10. CHEVROLET: 2%	$7,818,650	101	$55,000

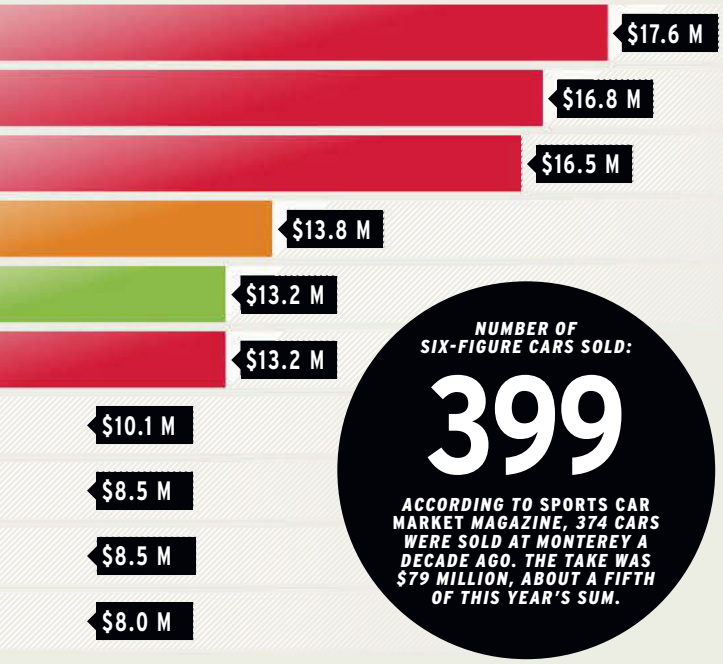
Number of Sales by Price



infographic by **WALTER BAUMANN**

GO KART OR GO HOME — *We omitted all the motorcycles, one boat, and any non-vehicle sales from our calculations. We also did not include this 1961 Car Kraft Go-Kart that Mecum sold for $10,000. That topped the highest bids earned by 17 cars.*





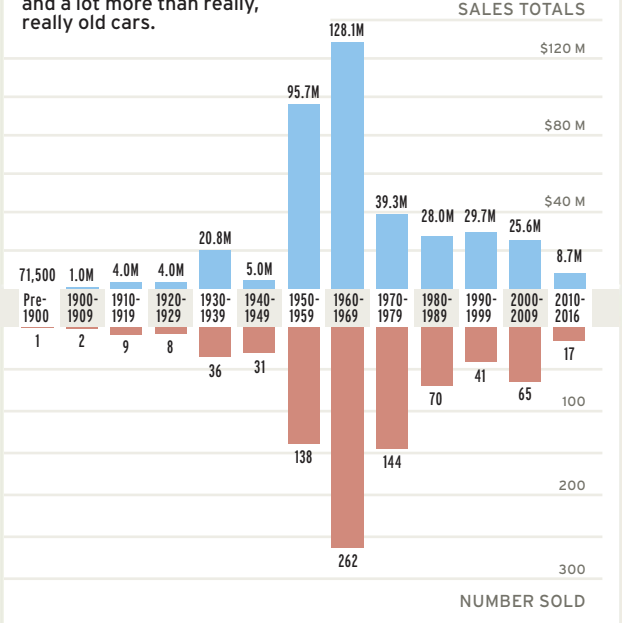
NUMBER OF SIX-FIGURE CARS SOLD:

399

ACCORDING TO SPORTS CAR MARKET MAGAZINE, 374 CARS WERE SOLD AT MONTEREY A DECADE AGO. THE TAKE WAS $79 MILLION, ABOUT A FIFTH OF THIS YEAR'S SUM.

Sales by Year

Car collectors love old cars more than really old cars, and a lot more than really, really old cars.



MONTEREY PHOTOGRAPH BY BLOOMBERG/CONTRIBUTOR; WOODWARD PHOTOGRAPH BY PAUL WARNER/GETTY IMAGES





GOING COASTAL

Two such celebrated automotive events could hardly be more different than Monterey Car Week and the Woodward Dream Cruise, but both take place every year on the third weekend in August. To help you decide which to attend, we've put together this handy decision guide. —*JARED GALL*

1. Beluga or Sterlet?
Beluga. There is no true caviar but Caspian Beluga sturgeon. (-1)
Sterlet? Nah, what's the one with the horn? Narwahl! (+1)

2. Look down. What color are your socks?
White (+1)
Beluga (-1)

3. Do you know how much those socks cost?
Yes (-1)
No (+1)

4. Seersucker is . . .
Not normally what I wear on formal occasions, but I make an exception for this weekend. (-1)
A lot lizard you can stand to look at. (+1)

5. You saw Nick Mason at . . .
It was either Goodwood or Le Mans, but I remember I was there with my Porsche 906. (-1)
It was at either Olympia or Cobo Arena, but I remember I was tripping balls. (+1)

6. Union dues . . .
Protect my right to safe working conditions and fair compensation. (+1)
Are a necessary byproduct of upgrading to the newer model with the improved headlights. Commonly known as "alimony." (-1)

7. Free association: Champagne . . .
Tête de cuvee or better. (-1)
. . . of beers! [belches, crushes High Life can against forehead] (+1)

8. You need tubs . . .
So I can fit 13-inch Mickeys under my Nova. (+1)
Because I fear the carbon-kevlar tub in my CLK GTR might crack if the dew point in the garage gets above 50, and I've only one backup. (-1)

9. Fernandez et Darrin . . .
Is easily one of my top three favorite Parisian coachbuilders. (-1)
The French are cannibals?! [scoffs] Which wine do they drink with that? (+1)

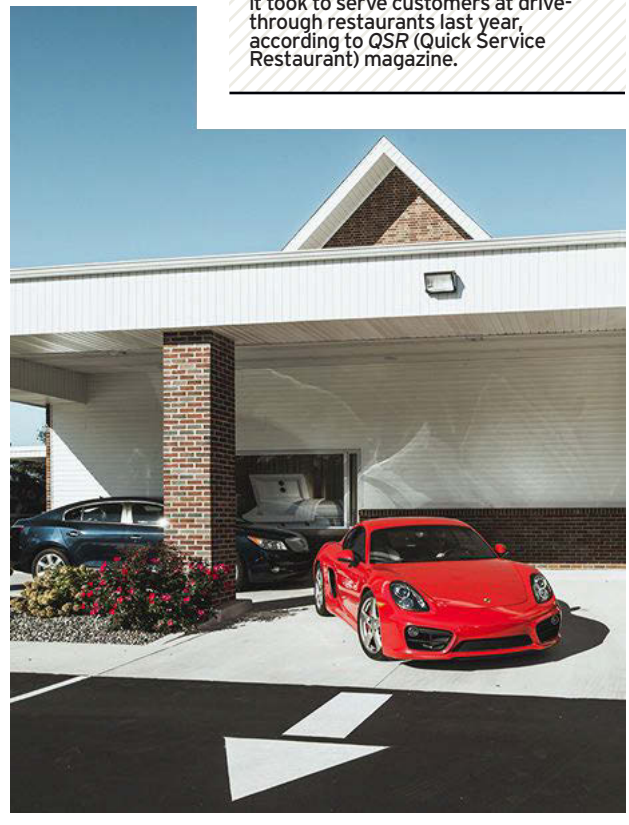
10. Enzo . . .
Signed three of my Ferraris. I've listed them together; if they clear reserve, I can buy another Canary Island. (-1)
It's "endzone," son. Didja get your bell rung on the way there? [laughs, whacks you on the back so hard that you spit out your caviar] (+1)

If you scored higher than 4, Woodward's the place. Lower than -4, Monterey it is. If you're in the middle, just go to whichever is on your side of the Mississippi.

181 Average number of seconds it took to serve customers at drive-through restaurants last year, according to *QSR* (Quick Service Restaurant) magazine.

Et Tu, Drive-Thru?

A WORLD OF SERVICES AWAITS PEOPLE TOO LAZY—NAY, EFFICIENT—TO GET OUT OF THEIR CARS. *by Andrew Del-Colle*



THE DRIVE-THROUGH and drive-in are distinctly American creations. Henry Ford and the Model T started motorizing the masses in 1908, and by 1921 you could park your touring car and have someone bring you a Tennessee-style BBQ Pig Sandwich at Kirby's Pig Stand in Dallas, Texas, the country's first drive-in. Soon after, the pursuit of convenience took off, and the drive-in became the "drive-thru" (no more having to back out!), first at banks, then at fast-food restaurants. Red's Giant Hamburg in Springfield, Missouri, is commonly recognized as the first drive-through hamburger joint. Since then, there has been no shortage of creativity when it comes to the services that can be procured without leaving the driver's seat. Drive-through liquor stores and weddings are only the beginning. Here's a sampling:

JOB FAIR
Omaha Job Fair
Omaha, Nebraska

FUNERAL HOME
Paradise Funeral Chapel
Saginaw, Michigan

SAFARI
African Safari Wildlife Park
Port Clinton, Ohio

CONVENIENCE STORE
Dairy Barn
East Northport, New York

COFFEE SHOP WITH BIKINI-CLAD BARISTAS
Cowgirls Espresso
Auburn, Kent, Lakewood, Renton, Seattle, Tacoma, and Tukwila, Washington

GROCERY STORE
Zoomin Market
Olathe, Kansas

FLU SHOTS
Community College of Baltimore County
Baltimore, Maryland

ORGANIC RESTAURANT
Amy's Drive Thru
Rohnert Park, California

PUBLIC LIBRARY
Westerville Public Library
Westerville, Ohio

LAUNDROMAT
Valley Drive-Thru Cleaners
Castro Valley, California

VOTING
Various Polling Locations
Denver, Colorado

OFF-TRACK BETTING
Keeneland
Lexington, Kentucky

CHURCH
Daytona Beach Drive In Christian Church
Daytona Beach Shores, Florida

ASH WEDNESDAY SERVICES
First United Methodist Church of Alabaster
Alabaster, Alabama

VOTER REGISTRATION
Various Locations
Hilo, Hawaii

ADULT NOVELTY SHOP
Pleasures Romance Boutique
Huntsville, Alabama

BUTCHER
Huntington Meat Market & Deli
Huntington, Texas

ONLY IN THE NETHERLANDS

ROAD RAVE

For an even trippier in-car experience, get thee to the Netherlands. About 60 miles southeast of Amsterdam, outside the city of Oss, there's a 500-meter stretch of road illuminated at night solely by glow-in-the-dark lane markings. A collaboration between Dutch artist Daan Roosegaarde and civil-engineering firm Heijmans, the section is a trial to determine the viability of luminescent paint as an energy-efficient alternative to overhead street lighting.



ROAD RAVE PHOTOGRAPH BY REMKO DE WAAL/GETTY IMAGES

top photograph by **ROY RITCHIE**

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CAFE Games

HOW THE EPA IS HELPING CARMAKERS HIT 2025'S 54.5-MPG CAFE STANDARD.

by Don Sherman

THE EPA AND carmakers used to square off like two grunting NFL squads. The EPA fights to curb energy consumption and reduce air pollution, while carmakers want to score customers, whose wish lists only occasionally include high mpg ratings. But four and a half years ago, after huddling with the 13 largest manufacturers, the UAW, and the state of California, President Obama blew the whistle on this old government-industry rivalry. Now these former foes have a common goal: a Corporate Average Fuel Economy (CAFE) target of 54.5 mpg by the 2025 model year. According to the EPA, reaching it will save consumers more than $1.7 trillion in fuel costs while curbing greenhouse-gas emissions by 6 billion metric tons throughout the life of vehicles produced from 2012 to 2025.

After the Supreme Court granted the EPA the authority to regulate greenhouse-gas emissions last year, the emphasis shifted from mpg to grams of CO_2 produced per mile of driving. Backed by the Intergovernmental Panel on Climate Change, the EPA figures that burning one gallon of gas emits 8887 grams of CO_2. So 54.5 mpg means 163 grams CO_2/mile. Manufacturers are spending billions on lighter, more-efficient vehicles to get there. Meanwhile, the EPA is recognizing creative ways to reduce vehicles' environmental impact. The most interesting of these is called Off-Cycle Credits, a roster of ways to chip away at CO_2 emissions that may not be reflected in the tests used to determine CAFE mpg figures. Companies employing these technologies earn credits without additional testing. Truck credits are higher because they burn more fuel and produce more emissions. Here are the currently eligible technologies:

CREDIT CHECK

Grams-per-Mile Credit, Car/Truck

Reduced cabin thermal loads: *up to 3.0/4.3*
Solar-reflective glass and paint are very effective at lowering interior temperatures and reducing HVAC system loads.

Battery charging with a 75-watt solar panel: *3.3/3.3*

Engine stop-start with cabin-heater operation: *2.5/4.4*
Toyota currently uses a system that stores heat in an insulated vessel for use in cold climates, to be released when the engine is shut down, which winds up saving fuel.

Engine stop-start without cabin-heater operation: *1.5/2.9*
This nets fewer credits because drivers are more likely to disable stop-start if occupant comfort suffers.

Active engine warm-up: *1.5/3.2*
Preheating engine coolant significantly trims consumption and emissions after a cold start.

Active transmission warm-up: *1.5/3.2*
Warming powertrain fluids diminishes friction losses and smooths upshifts. Some Ram trucks already use this technology.

Waste-exhaust heat recovery, 100 watts: *0.7/0.7*
Thermoelectric generators convert waste-combustion heat to electricity for powering a propulsion motor or reducing the alternator's load. No manufacturer has put such a system into production yet.

High-efficiency lighting, 100-watt savings: *1.0/1.0*
LED lighting consumes half the energy of HID lamps and only a quarter as much as halogen lights providing the same illumination.

Active aerodynamics, 3-percent drag reduction: *0.6/1.0*

SMALL SAVINGS, BIG GAIN

Manufacturers can also nominate new methods for consideration. Last year, Mercedes-Benz applied for a 9.1-grams-per-mile credit for its stop-start system in cars and 17.1-grams-per-mile credit for its trucks. The EPA granted credits of 3.7 and 3.6 grams per mile for 2012–2016 model years. GM applied for and received a 1.1-grams-per-mile credit for cars equipped with more-efficient air-conditioning compressors.

Off-cycle credits are limited to a maximum of 10 grams of CO_2 per mile per vehicle (or 3 mpg). That may seem like small potatoes, but it tallies up to millions of dollars and tons of CO_2 when multiplied by the number of vehicles produced and each vehicle's 200,000-or-so-mile service life.

illustration by **TAVIS COBURN**

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Three's a Crowd

THE THIRD IN OUR FIVE-PART SERIES ON CAR COMMERCE SAYS: A DIGITAL BATTLE PITS CARMAKER AND DEALER AGAINST THE MIDDLEMAN. *by James Cobb and Norman Mayersohn*

IT WAS JUST A CRUMB OF NEWS on the floor of the vast American car market: In July, AutoNation, the publicly traded megadealer that is the country's largest new-car retailer, severed its ties to TrueCar, the third-party shopping service that referred prospective customers to its stores. But the split may have consequences beyond the spat over business practices and data ownership that caused the separation. After years in which dealers willingly ceded the online sales turf to intermediaries, car sellers are now fighting back. Just as hotel chains have been building their own apps to reclaim travelers from aggregators such as Priceline and Expedia, automakers and dealers are creating digital storefronts to wrest online shoppers from the middlemen.

Late last year, AutoNation rolled out AutoNation Express, spending $300 million on data systems to track the 70,000 vehicles in its national inventory. Carmakers are stepping up, too: In May, Toyota started a pilot program for its Scion brand called Pure Process Plus, aimed at young, tech-savvy consumers. The results have been encouraging enough that the company is launching a similar online shopping tool for the Toyota brand next year.

It will join Ford Direct, the granddaddy of automaker sites that was launched in 2000, and General Motors' two-year-old Shop-Click-Drive, for which GM hired 8000 programmers, according to the *Wall Street Journal*. What these carmaker shopping sites have in common is speeding customers far enough through the sales process so that a local dealership merely has to dot the i's and cross the t's. Scion Pure Process Plus handles every stage of a new-car transaction, including credit approval. Once buyers finish, they print a certificate to take to the dealer in exchange for the keys. The goal is to have the customer driving away in an hour.

Among the established third-party shopping services, TrueCar is the one that has shaken up automotive retail the most. What sprang up in an era of research sites that served up the holy grail of dealer invoice pricing is today a sophisticated network. Dealers subscribing to TrueCar can deliver no-haggle quotes to shoppers based on typical local transaction prices, information that is provided by these same retailers. Dealers pay a monthly fee to participate and also pay around $300 each for referrals that lead to a new-car sale. TrueCar itself is something of an iceberg with only its tip showing; most of its business is cloaked by partnerships with huge affinity groups such as AARP, American Express, Consumer Reports, and Costco.

There are strong incentives for automakers and dealer chains to bring the online shopping process in-house. Dealers are eyeing the spiffs they pay for the leads, but there is also the issue of transaction data, which TrueCar collects from its subscribing dealers. AutoNation walked away because of TrueCar's demand for information from all its sales, not just the ones that resulted from a TrueCar lead. This practice makes TrueCar stand out among third-party lead providers, and it's how the company provides deal context to car buyers, assuring that they'll "never overpay," as promised in the company's tagline. Implicit in AutoNation's decision is the understanding that there is big value in this data, and not just to TrueCar.

For car manufacturers, there are other concerns, such as the customer experience and the brand positioning their marketing budgets seek to reinforce. Automakers have been less than thrilled with race-to-the-bottom competition among dealers. Honda and Toyota have threatened action against those stores that advertised below-invoice prices, a practice that has been widespread on third-party sites.

Nearly everyone in the business recognizes that the old model is on borrowed time, and that inevitably larger percentages of new cars will be bought over the internet. In the coming showdown for digital turf, the automakers have the name recognition and financial resources, the dealers have the protection of state franchise laws. But the independents have vast member networks, an established track record, online expertise, user trust, and a reach that encompasses all brands and models. The winner? It may be the customer, who stands to spend less time kicking tires and jousting with the finance office.

illustration by **ANDY POTTS**



2016

Corolla S

Clutch in. Boredom out. It's time to put the fun back into driving. The 2016 Corolla brings even more excitement to your drive, thanks to an available 6-speed manual transmission. Stir the driver in you.

TOYOTA | *Let's Go Places*

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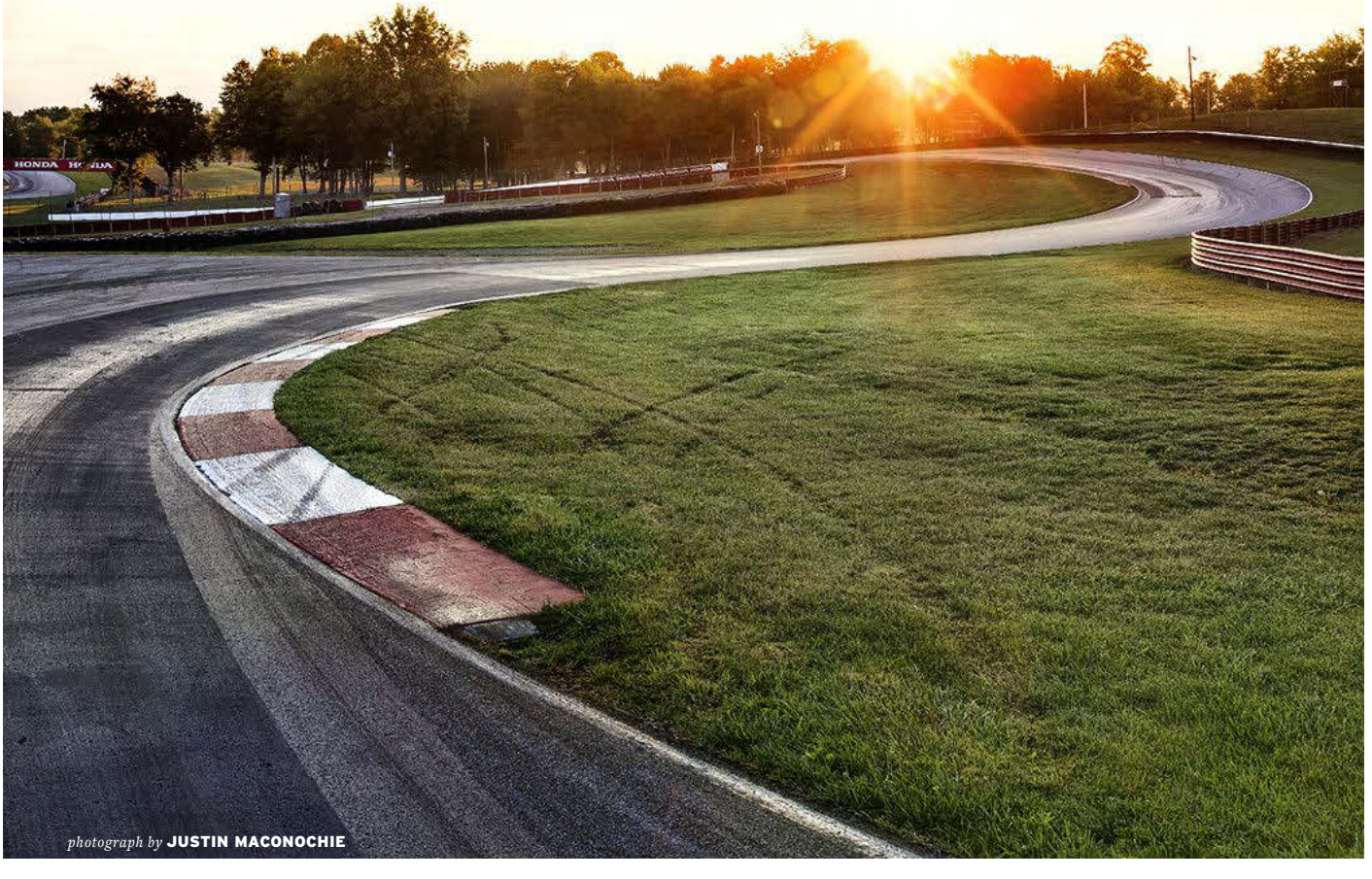
TOYOTA
Let's Go Places

Ohio Turnpike

HOSTING EVERYTHING FROM SCCA REGIONALS TO INDY CARS, MID-OHIO HAS BEEN AN ELITE ROAD-RACING TRACK FOR MORE THAN 50 YEARS. *by Csaba Csere*

track clinic

SITUATED JUST 61 MILES NORTH of Columbus, the state capital, Mid-Ohio is a great road-racing track for three reasons. First and foremost, it's challenging, combining undulating terrain with deviously interrelated corners. Second, Mid-Ohio is an excellent facility, with practical garages, lush green lawns, and clean and comfortable restrooms. Many tracks provide these amenities today, but Mid-Ohio had them decades ago, when most tracks were still using outhouses. Third, at Mid-Ohio, an amateur can experience the same track used by the top road racers in the country. When has anyone ever gotten their Mk2 Volkswagen GTI sideways at Spa?



photograph by **JUSTIN MACONOCHIE**



THE ORIGINAL TRACK WOUND AROUND AN OAK TREE HERE, BUT RACERS THOUGHT IT WAS TOO SLOW. THAT SECTION WAS STRAIGHTENED OUT IN 1964.

HISTORY

Mid-Ohio was constructed in 1962 on a couple hundred acres of rolling hills near Lexington, Ohio, by Les Griebling, a successful local farmer who personally drove the road grader that laid out the original course. The track cost a piddling $250,000 to build, including the land, mostly because Griebling put in so much sweat equity.

The first event was in August 1962, and thanks to its proximity to Cleveland, Columbus, Cincinnati, and Detroit, the track soon started





attracting professional races. In 1963, it hosted a United States Road Racing Championship event, which was the precursor to the legendary Can-Am series. It started holding Trans-Am races in '67, and the Can-Am series added Mid-Ohio to its schedule in '69.

The original track spread 15 corners over 2.4 miles, and the layout hasn't changed much over the past six decades. Though the track has been resurfaced a number of times and widened slightly, to 40 feet, the only recent major change to its geography came in 1990, when a straight-through bypass was added near the chicane after Turn 1. This eliminated two corners and shaved about an eighth of a mile, dropping a lap of the track to 2.26 miles. This is generally regarded as the "pro" configuration, while the older layout is now the "club" circuit.





Since 2011, the track has been owned by Green Savoree Racing Promotions, which has upheld Mid-Ohio's distinction as a beautifully maintained and highly challenging race course.

LAP RECORDS

THE VARIETY OF RACING MACHINERY THAT COMPETES AT MID-OHIO IS REFLECTED IN THE RANGE OF ITS LAP RECORDS:

1:04.58
INDYCAR
SCOTT DIXON
CHEVROLET
2015

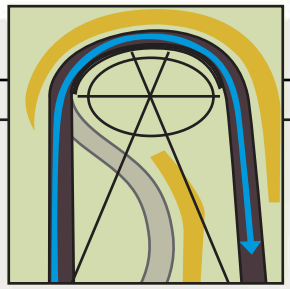
1:08.54
AMERICAN LE MANS SERIES
MARCO WERNER
AUDI R10 TDI
2008

1:16.50
ROLEX SPORTS CAR SERIES
JON FOGARTY
CHEVROLET RILEY
2011

1:21.24
TRANS-AM SERIES
TOMY DRISSI
CHEVROLET CORVETTE
2013

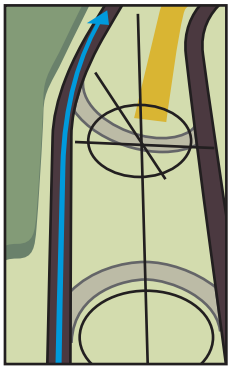
1:24.45
NASCAR NATIONWIDE SERIES
MICHAEL McDOWELL
TOYOTA
2013

1:42.75
SPEC MIATA
BRIAN MURDICK
MAZDA MIATA
2013



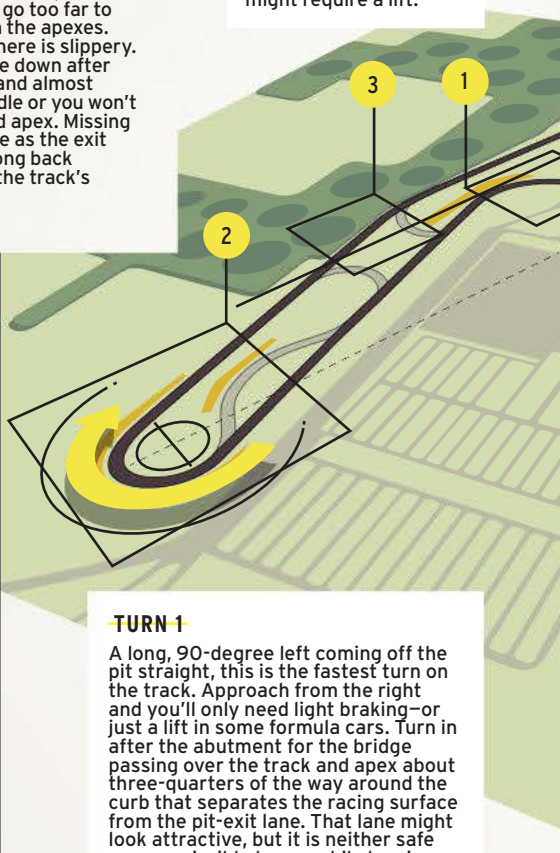
TURN 2: *KEYHOLE*

In the pro configuration, it's a straight run from the Turn 1 exit to the Keyhole, which consists of two 90-degree rights. While it is possible to make one single turn out of the Keyhole with a late apex in the second right, most drivers treat it as a double-apex corner. Either way, brake hard before the crest near the first apex, while you have good grip. This is a common passing zone, so enter between the middle and left side of the track to defend your line. With the double-apex line, the key is to not go too far to the left between the apexes. The pavement there is slippery. Let the car settle down after the slight crest and almost coast in the middle or you won't make the second apex. Missing it is a big mistake as the exit leads onto the long back straight—easily the track's fastest section.



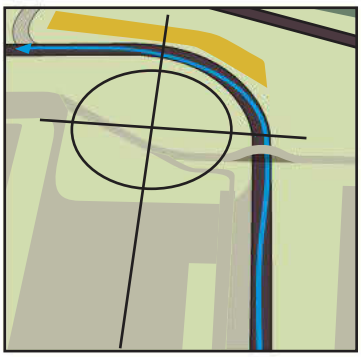
TURN 3

This right-hand kink is almost always taken flat in the dry, but can be slippery in the rain and might require a lift.

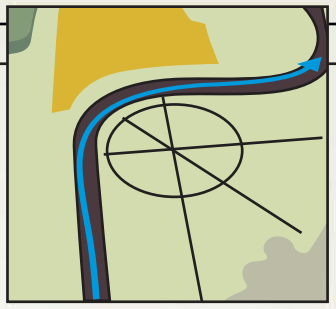


TURN 1

A long, 90-degree left coming off the pit straight, this is the fastest turn on the track. Approach from the right and you'll only need light braking—or just a lift in some formula cars. Turn in after the abutment for the bridge passing over the track and apex about three-quarters of the way around the curb that separates the racing surface from the pit-exit lane. That lane might look attractive, but it is neither safe nor permissible to use while lapping.



illustrations by **OLLIE BLAND**

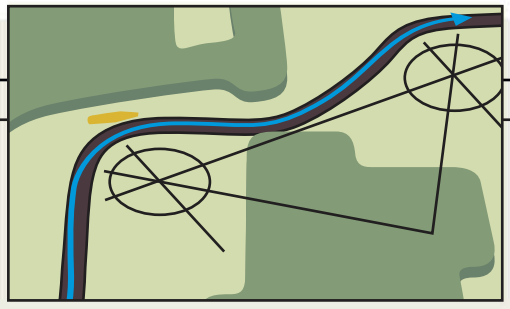


TURN 4

You arrive at Turn 4 with lots of speed (Indy cars come in at about 180 mph); brake heavily as you enter this right-hander from the left. There's a lot of camber running the full width of the track, so you have some flexibility for your line, which makes this a great corner for passing.

TURN 5

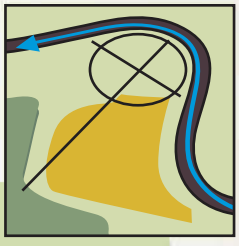
This longish left-hander goes up, over, and down a steep hill. Enter from the left, where the exit of Turn 4 placed you, and simply apex at the crest of the hill. Once the car is settled after the crest, you can accelerate toward 6 while steering left. Attempt to keep too far to the left and your car will likely get unsettled, opening you up to being passed on the right going into 6.



TURNS 6, 7, AND 8: *THE ESSES*

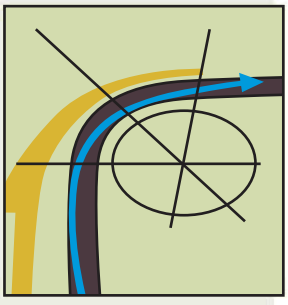
These three corners are linked, so the correct line is critical. A little trail-braking will help plant your car's front end and point it toward the apex on the right near the end of the curbing. But the key here, as in 5, is not to track out too far on the exit. Stay about a car's width from the left edge of the track and you'll be well set up for Turn 7. Apex 7 at the end of the curbing, before the hill, and be careful with the power as you crest it. As soon as the car settles down, turn in for 8. You can miss the apex here slightly as your key concern on exit will be the next corner. Following the right line, 7 and 8 are generally flat in a street car.





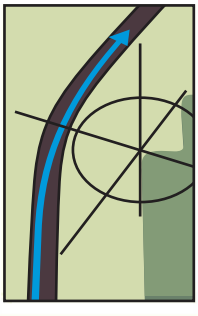
TURN 9

There's not enough distance from the exit of 8 to get all the way to the left and parallel to the track edge before you have to start braking for 9. The solution is to go left but forget about getting parallel. This stretches the 90-degree turn into a 95-degree one, but at least you get to brake in a straight line with a settled car. Turn 9 climbs another hill, so apex late but before the crest. Then you can start getting on the gas, though your car will still get light and drift to the left as you hurtle over the top.



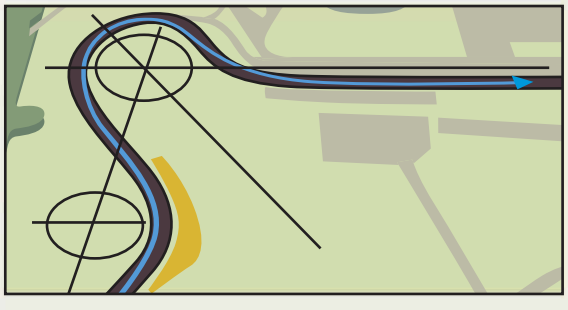
TURN 10

A fast, flat bend to the right, and then it's best to stay to the right coming out to help your entrance into 11.



TURNS 11, 12, AND 13: *CAROUSEL*

Turn 11 is a fast, off-camber left-hander. A tap of the brakes will help you stick close to the inside curbing. The key is to come out of 11 on a straight line so that you can brake hard going into Turn 12, the Carousel. Treat the Carousel as a double-apex corner, with the first apex at the small crest, which requires you to ease your braking as your car's tires unload. Continue about three-quarters of the way across the track before turning toward the second apex. Once you're there, hold the car to the right to set up for the left-hand Turn 13, a slight bend that leads onto the front straight. Stray no farther left than the middle of the track and you'll be okay.



WHAT TO DRIVE



▲ **CHEVROLET CORVETTE**
Just about any vintage of Vette will provide plenty of power and grip to make for an interesting lap.

▼ **PORSCHE 911 GT3**
The GT3 has the goods to turn even the fast bends into serious corners. With higher corner-entry speeds, you'll have to maintain a precise line to allow late braking.





◀ **SUBARU WRX**
This four-wheel-drive sports sedan's stability makes it ideal for learning the track. But it's also fast enough to keep your education interesting.

WHERE TO STAY

$–TRAVELODGE, MANSFIELD
Very basic accommodations for those choosing between tires and a roof over their heads.

$$–THE PADDOCK INN, LEXINGTON
A B&B, right in town and universally acclaimed, but it gets booked up early.

$$–WISHMAKER HOUSE, BELLVILLE
Another well-loved B&B, less than 10 miles from the track.



TRAVELODGE PHOTOGRAPH BY JUSTIN MACONOCHIE

by John Phillips

THE AFFLICTIONS OF SUMMER.



The driver's seat in my Toyota Tundra is covered in a snow-white Merino sheepskin I bought in New Zealand. Of late, I've been finding it peppered with black seeds. "These aren't mouse turds, are they?" I asked my wife, who studied one of the seeds as you might study a small emerald.

"Not turds," she flatly confirmed, putting me in a good mood until the debris returned the next morning. I placed one of the offending specks on a napkin and took it inside for further forensic servicing.

"What you've got there is a turd," she stated confidently, which made me want to question her previous finding, but I let it go. "Look for a nest," she suggested.

Between the truck's intake manifold and the firewall was a bed of chewed foam insulation sufficiently luxurious to star in a Hilton ad. I came back from the hardware store with JT Eaton Bait Blocks, Tomcat Bait Chunx, Ramik Green Nuggets, eight trays of d-CON, a Farnam Just One Bite Bar, and four old-fashioned Victor spring traps. Also a Victor Ultimate Flea Trap, in case the mice were flinging fleas in the truck's carpet, although it later occurred to me that it might *cure* their fleas, encouraging them to return for successive soothing treatments.

Twenty-four hours later, the mice had eaten two entire bowls of d-CON and had carried various rodenticidal hors d'oeuvres to all four corners of the truck. Forty-eight hours later, the same. How could a mouse family eat four bowls of d-CON and still be contentedly turdifying my sheepskin? Yet they were. So I loaded all four Victor spring traps with peanut butter and turkey bacon and a dash of salt.

C/D readers may never have learned the first useful item from any of my writing, but today is different. Here's something you didn't know: You can drive around town in a truck with four loaded spring traps in the footwells and never set one off. Really. I drove to the liquor store, where the clerk helped me carry out an exhaustive selection of pinot grigio. "Don't reach inside my truck," I warned at the curb. "Buncha animal traps in there."



Could be some mousetraps in there, too.

"Theft prevention?" he inquired. "You should get the kind where the horn just honks."

The next morning, two sleek white-bellied mice had met Mickey their Maker in the copper-colored jaws of the Victor traps. The day after, two more, each the size of a Little Debbie cake oozing raspberry filling. I performed a modest dance, tossing mouse corpses between festive leaps.

That's when I was beset by another affliction of summer—white dime-size blemishes all over my truck's painted surfaces and glass. I drove to Sober Automotive, home of sober decisions, and a gent there told me: "What you got, bud, is Type I, II, or III evaporative water spots, mostly magnesium and calcium suspended in your well water. Try distilled white vinegar." So I thanked this sober man, promising to give him all of my future business, and he said: "Oh, I don't work here. I just deliver parts."

The vinegar had no effect except to smell like I had a cat problem. Neither did paint cleaner nor rubbing alcohol nor ammonia. I watched a YouTube video suggesting a five-step clay-bar rub-out. That took me two days. It had no effect except to make the water spots much shinier. Eventually I bought seven water-spot removers, a festival of chemotherapy that should have merited an EPA permit. I stood in the truck's bed and applied these potions to the roof, hoping no one would see the occasional damage I was inflicting with, for instance, a rubbing compound whose ingredients must have included gravel, given its ability to destroy paint. Next to each practice patch, I applied a Post-it Note enumerating the chemicals I'd applied. After a while, the skin on my fingertips flaked off.

It took forever, but most of the water spots were more or less eradicated by Meguiar's Water Spot Remover, 3D Eraser, and Mothers California Gold Water Spot Remover for Glass. A warning on the latter said, "Exterior glass only—avoid paint and trim." Except it worked so well on paint and trim, especially on the plastic grille, that I had little left for actual glass, which was fine, because it was totally ineffective on glass.

Then I ordered a CR Spotless Water Systems DIC-20 ($450), which attaches via stainless braided hose to your outdoor spigot and, via two 20-inch filters that you'd expect to find on a Disney cruise liner, purifies water so exhaustively that it could be used for satisfying medical experiments on garage mice. After the purifier arrived, a nice person named Kelly emailed, asking if my truck was "shinny."

"Shinny and turdless," I responded.

Then my barber, Hope, advised, "Once every two weeks, dismantle your jockey box and drag out the remaining dead rodents." A "jockey box," she told me, is a glove box. So. You've learned a second bait-chunk of wisdom. That's all I've got.

Last week, Phillips revealed a second infestation. He's in counseling. Again—Ed.



Tim McGraw has a challenge for you.

I've seen first-hand how diabetes impacts Americans from all walks of life. It's affected my family, friends and fans.

- Tim McGraw

Nearly 30 million Americans have diabetes – most have type 2 diabetes. That's why I'm speaking out about how important it is for those living with type 2 diabetes to get their blood sugar under control.

I'm encouraging all Americans to join me and challenge their family and friends with diabetes to get to their A1C goal.* I've learned that about one-third of adults living with diabetes are not at their A1C goal, which can lead to serious health problems over time.

Let's change that statistic.

If you have diabetes, take the challenge. Pledge to work with your doctor to set and reach your own A1C goal. Also be sure to learn if you are at risk of low blood sugar and how to reduce that risk. **

Join me now at **AmericasDiabetesChallenge.com.**

Together, we can make a difference.

American Diabetes Association®

America's Diabetes Challenge was developed in collaboration with Merck

* A1C measures average blood sugar (glucose) over a 2 to 3 month period.

** Low blood sugar (glucose), known as hypoglycemia, can make you feel shaky, dizzy, sweaty and sometimes faint.

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by Aaron Robinson

BY BROOKS TOO BROAD FOR BONGOS.



I write this on an airliner headed west from London. If you haven't seen a couple of D-type Jags powerslide out of a corner in hot pursuit of a crackling Ferrari 246S Dino, then you need to go to the Goodwood Revival in September. If you haven't seen 150,000 people glammed up in vintage tweed and gabardine and taffeta, been buzzed by a dozen Spitfires at once, applauded the riders of a pair of Norton Manxes for dicing from the green to the checkered, gawped at a 427 Cobra cornering on three wheels, or felt proud to be a Yankee as a Ford Fairlane bellowed through a picket line of Alfas and Cortinas to kick ass on foreign soil, then you need to get to Goodwood. For me, the Revival capped a summer of deep immersion in British motoring culture, most of it a lot more prosaic than Goodwood. It all started because my wife's company decided to airmail her to Madrid for three months starting in July. Madrid is in the dead center of an arid country, and in July and August you can bake a potato on the sidewalk. So I said I wasn't going. I said that the summer is when you go north, so meet me in England and we'll go camping in Scotland for a couple of weeks and scramble around castles and hike the fells and eat, well, if not haggis exactly, because it's disgusting, then haggis-flavored Pringles. She agreed, and then the next question became what to drive.

A lot of schemes were considered, including buying a '76 Buick Estate Wagon and shipping it over. But there were issues, not the least of which were Britain's $7-a-gallon gasoline, the question of where I'd find a new Delco starter on the island of Skye, and the challenge of docking a Detroit behemoth in a Scottish village without knocking over a 13th-century abbey or flattening a few sheep. Sense prevailed, and, leaning heavily on my friend Ken Evans in England for a proxy inspection and garaging services, I bought a slightly shabby 1995 Mazda Bongo Friendee campervan for four grand.

Along with the Isuzu Light Dump and the Suzuki Every JoyPop, the Bongo Friendee appears on a lot of internet lists of insane Japanese car names. It's a boxy little minivan with three rows of seats and pull-down window shades, and was sold in Japan to outdoorsy families and possibly a few pedophiles. The one we found has a 2.5-liter four-cylinder diesel under the front seats, a four-speed automatic, and the optional four-wheel drive. More important, it also has the "Auto Free Top" motorized roof tent and a small kitchenette, plus more warning beeps and chimes than the White House security office.



Britain's roads make even a Mazda Bongo look big.

The British conquered India in part by being a camping people, and they are nuts for these little vans (check out the YouTube videos), which are imported as used cars. Bongoisti flash their lights at each other when they pass in the lanes, and in the campsites they compare their fuel economy and gray-water plumbing. We dropped a couple hundred more for licensing and some dubious (but, thankfully, unneeded) insurance from a company based in Gibraltar and set off for the borders. The sturdy Bongo transported us to a summertime Scotland of moated castles, windswept crags, bagpipe bands, and sheep-racing festivals. It earned our affection, even if at times it felt like living on a small sailboat.

Evans grouses that England is 60 million people crowded onto an infrastructure sized for 30 million. Every June, the schools let out and the Queen's subjects get in their campers and RVs and reenact the Roman chariot race from *Ben Hur* for six weeks. Even in the off-season, car trips take longer in Great Britain because of the traffic, the speed cameras, and the pinched roads. In the countryside, the hedges close in so tightly that you feel as if you're flying down the trench of an organic Death Star. A hundred-mile journey can take all day, not counting pit stops for sausage rolls.

Not that it would be better off with more roads. The pastoral delights of the British countryside, well documented by authors greater than I, are already under enough assault. South of Manchester and east of Wales, it's hard to find a footpath to a shady wood that doesn't suffer at least some noise from a nearby road. If Jane Austen's characters came to life today, they'd testify that cars ruined England. The speed cameras and the shortage of superslabs, while maddening to both Brits and Americans alike, seem an effort to reconcile the universal desire for expediency with the particularly British infatuation with the past. Britain, which produces regency dramas and Formula 1 cars of equal quality, is an island tugged at by the opposing gravitational forces of history and modernity.

The Goodwood Revival is a few of Britain's finest hours, cleansed and beautifully packaged and beloved by people who generally find more comfort in the past than the future. Goodwood is thus suspended in that same tension as the racing gets closer and the wrecks get worryingly more severe. Eventually, somebody will be killed, and the organizers, like the road builders, will have to decide exactly how much of the nostalgically remembered past they wish to preserve.



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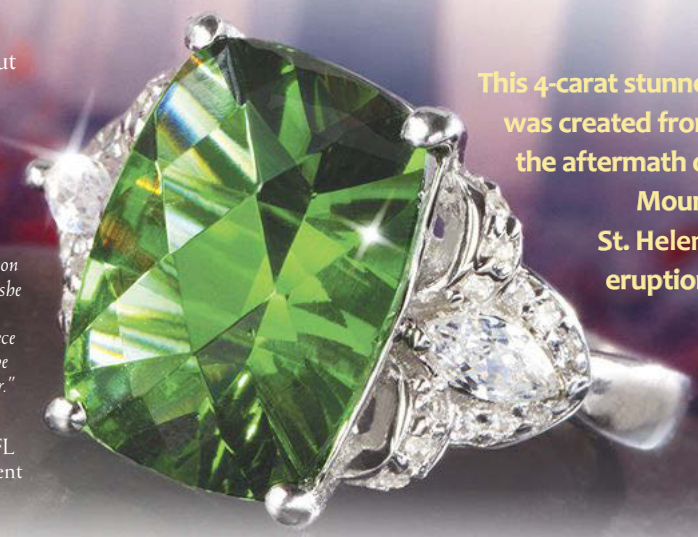
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by Ezra Dyer

I'M THINKIN' ABOUT LINCOLN.



Car launches follow a standard template: Fly somewhere, check into a hotel, spend a day driving, and then regale your fellow gout-ridden hacks with bawdy lies while an attentive waitstaff discreetly sweeps the crumbs of aged Beemster from your tablecloth and/or beard. I usually feel bad for the PR people, who typically face several cycles of this process, a tedious Groundhog Day where every dinner conversation eventually turns to winter tires or motor-oil detergents. So when the Lincoln people told me they wanted to do a different kind of launch, one where they'd hand me the car and I'd go where I wanted, that sounded appealing. I'd drive somewhere and they'd pick up the hotel, as they would on a normal launch. I'd have more time to drive the car and no time at all devoted to business-casual cocktail receptions in the hospitality suite. Excellent.

But when the FedEx envelope arrived containing a stack of Visa gift cards to cover my "expenses," I was firmly told by The Management that I had to send them back—despite my roster of really hilarious ideas on how to spend them. Hey, that's okay, man. I've been driving a Lincoln since long before anybody paid me to drive one.

Indeed, I believe I am the only automotive journalist who owns a contemporary Lincoln, a 2010 MKT EcoBoost. I didn't buy it to be cool (which might go without saying), but I did buy it to make a statement. And when I figure out what that statement is, I'll let you know. In the meantime, I've got a twin-turbo minivan with a tow package and caramel-hued leather that's steadily accruing a protective layer of crushed animal crackers and melted gummy worms. And that's just the driver's seat. You should see what it looks like back in the second row. Can biohazards void your warranty?

So, the MKX. I think Lincoln was hoping that I'd do lots of via ferrata hikes or SUP fly-fishing or underground-cave yoga—the kinds of affluent active-lifestyle pursuits associated with the younger demographic it's intending to court. Instead, I did the same thing I do as an actual Lincoln owner, which is nothing. I have two kids under the age of six. I haven't played golf in a year. And that's only partially because I hate golf. Right now my two favorite hobbies are peace and quiet.



Lincolns come in all sorts of wild colors, such as white.

What I did do is drive the MKX 1132 miles. On the way back from Summit Point, I covered 370 miles nonstop, a testament to the MKX's soothing demeanor. I'd never rack up that kind of mileage on a traditional launch, and the extensive wheel time revealed a few insights about the MKX and a few more about the grander schemes of the Lincoln Motor Company.

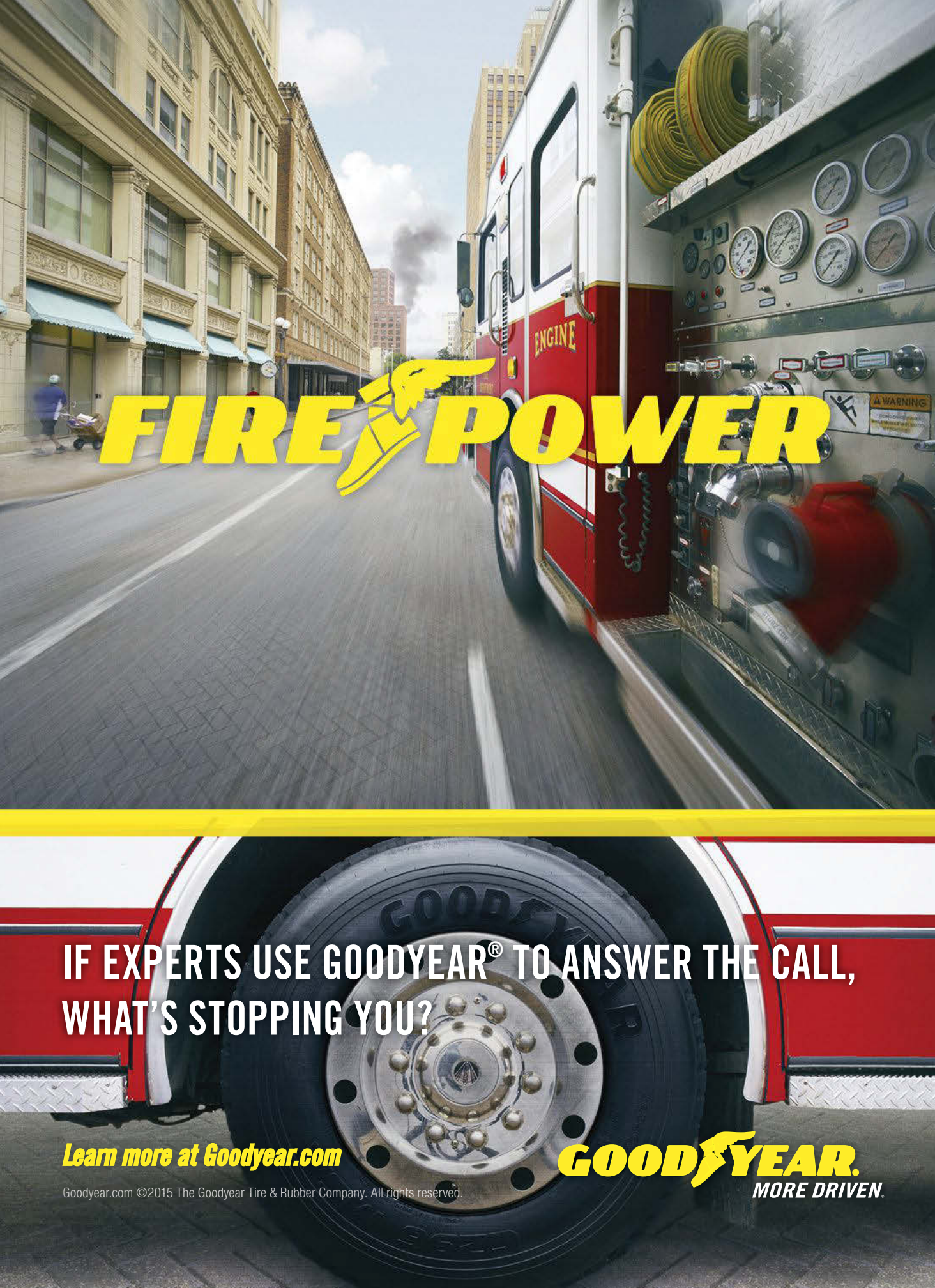
The MKX (larger than the MKC and smaller than the MKT, in case you're not fluent in the MarKeting) is generally well executed. The model I drove had the 335-hp EcoBoost, the Revel superstereo, and a motorized forward camera that Pinocchios out from behind the grille badge. But the MKX faces the same challenging family dynamic as all current Lincolns, in that it's a first cousin of a Ford—in this case, the Edge. And herein lies the problem: If the Ford version of a vehicle isn't impressive, then the Lincoln version isn't likely to fare better. And if the Ford version is great, then why not just buy the Ford?

Yes, Lincoln will throw in some nicer trim, a fancier stereo, and massage seats that get borderline inappropriate. But people don't buy a Lexus ES350 because it's so much better than a Toyota Avalon. They buy it because that L on the grille means something, and it means something because there's an LS and an IS and an RC, cars without a Toyota equivalent. It's not an inherently bad idea to spin a luxury car off a proletarian platform, but the upcoming Continental is the only Lincoln without a direct Ford counterpart—and even that one is based on a stretched and upfitted Fusion. Acura is Lincoln's closest competitor, but Acura will soon have the NSX.

If I were Lincoln's Director of Resurgent Glory, I'd issue a few directives posthaste. First, I'd raise hell at corporate over the lockstep-Ford model strategy. If we're gonna do that, then where's my Lincoln Mustang? My Lincoln Raptor? I can get black rims on an Edge but not on an MKX? Yeah, the black-rims thing may be stale. That's not the point. The point is: Stop holding out on me, Ford.

At the dealerships, I'd have salesmen bad-mouth the Ford-buying riffraff: "Bart—can I call you Bart?—I'd sell you an Edge, but Edge customers are, how should I say, gross? You look like an MKX man. No mustard stains on you." Ford shoppers would get a populist earful about Mr. No Mustard Stains shopping for a fancy Lincoln. Divide and conquer!

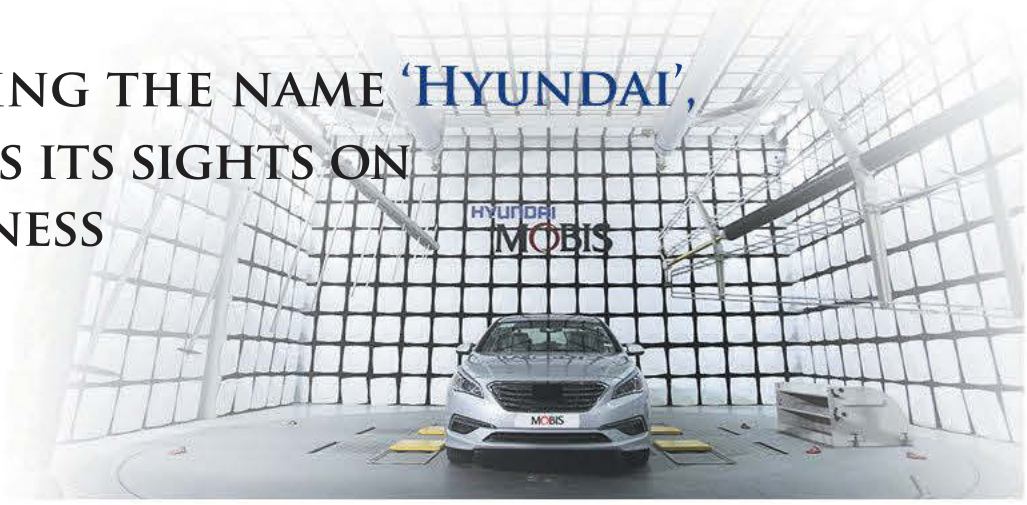
Finally, I'd insist on real model names. Maybe dredge up some other dead presidents. (I hear McKinley's looking for work.) Or use old Lincoln concept-car names, like Mardi Gras and Machete. I would *love* to call my MKT the Machete, but my car already has a new name. I may not have all the answers for Lincoln, but I'll do some more brainstorming the next time I'm driving my Town Car.



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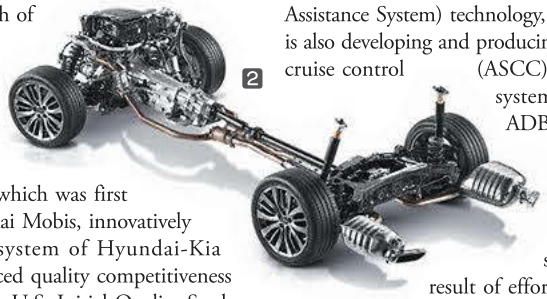
Transcending the name 'Hyundai', 'Mobis' sets its sights on global business



As announced by Automotive News this past June, Hyundai Mobis was ranked 6th among global auto parts manufacturers, maintaining last year's record. The company has grown to become a world-renowned auto parts maker within just 15 years after being transformed into a manufacturer specialized in auto parts as a means of business rationalization in 1999.


1

Despite the relatively short history compared to other auto parts manufacturers, Hyundai Mobis has quickly positioned itself to share company with more established manufacturers thanks to the explosive growth of its sister companies Hyundai Motor Company and Kia Motors. Conversely, the constant R&D and intense quality management of Hyundai Mobis has significantly enhanced the competitiveness of Hyundai-Kia Motors and created an environment for win-win development, which has contributed to the overall growth of Hyundai Motor Group.


2

In particular, modularization, which was first introduced in Korea by Hyundai Mobis, innovatively overhauled the production system of Hyundai-Kia Motors and remarkably enhanced quality competitiveness and productivity. In fact, in the U.S. Initial Quality Study announced by J.D. Power this year, Kia Motors was ranked 1st and Hyundai Motor Company was ranked 2nd.
Hyundai Mobis is now supplying a wide range of auto parts to major automobile manufacturers all over the world beyond Hyundai and Kia Motors, and the volume of exports to car makers other than Hyundai-Kia is rapidly increasing: $1.82 billion in 2011, $2.26 billion in 2012, $2.65 billion in 2013, and $2.83 billion in 2014.

Exported items and clients are also becoming more diversified. Hyundai Mobis is supplying items such as audio, IBS (Intelligent Battery Sensors), vehicle lamps, and ICS (Integrated Center Stacks) to BMW, Volkswagen, and PSA in Europe; ICS to GM in the U.S.; and lamps to Mitsubishi and Subaru in Japan. In 2002, Hyundai Mobis starting supplying steering columns to Chrysler, its first automaker client aside from its sister companies, and has since been in a partnership with Chrysler for almost 15 years, exporting modules in 2006 and lamps in 2007.


3

Hyundai Mobis has been able to obtain more orders from new automakers while maintaining its previous partnerships thanks to its efforts in technological development as well as its adherence to quality and deadlines.


4

Hyundai Mobis has already proven itself to be one of the best in the world in traditional machine parts, successfully manufacturing over 100 million vehicle modules in just 14 years as of 2013. Moreover, it spares no effort and support in enhancing its competencies in technological development under the belief that internalization of core technologies in future cars will guarantee the sustainability of the company. Hyundai Mobis already operates its R&D centers U.S., Europe, China, India and Korea, and it has recently built a new one in 2013 specialized only for electronic parts. Accordingly, Hyundai Mobis is recruiting more and more of R&D staff. .

Based on such investments, Hyundai Mobis is accelerating the development of DAS (Driving Assistance System) technology, which is a prerequisite for self-driving cars. Hyundai Mobis is also developing and producing safety convenience technologies such as an advanced smart cruise control (ASCC), a lane departure warning system and lane keeping assist system (LDWS & LKAS), a high beam assist system (HBA & ADB), an autonomous emergency braking system (AEB), a smart parking assist system (SPAS), and blind spot detection (BSD).

Last year, Hyundai Mobis also succeeded in demonstrating self-parking and autonomous driving before the media as a result of efforts toward preemptive development of autonomous driving technology.

Hyundai Mobis plans to make continued investments in R&D and quality control while focusing on sales in order to acquire new clients, thereby achieving 20% of total sales that are solely attributable from exports to global automakers by 2020.

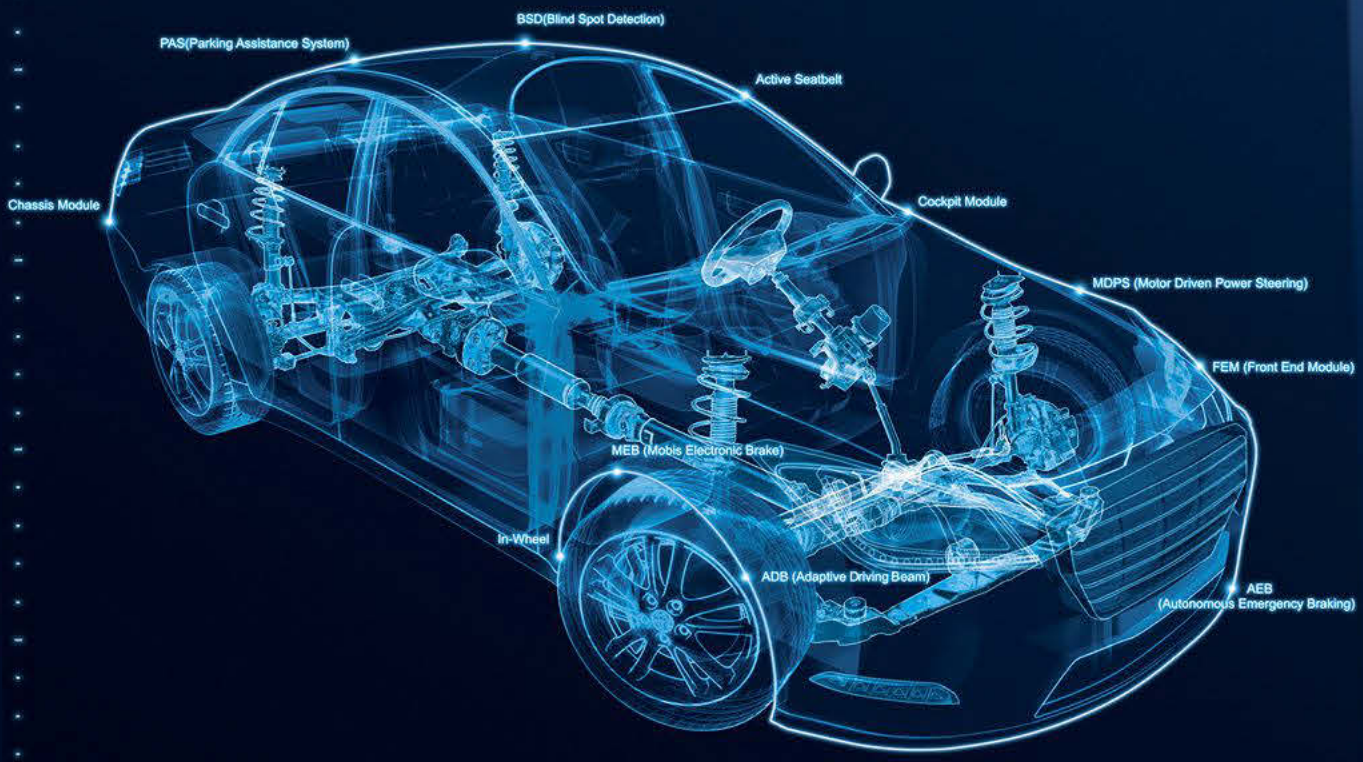
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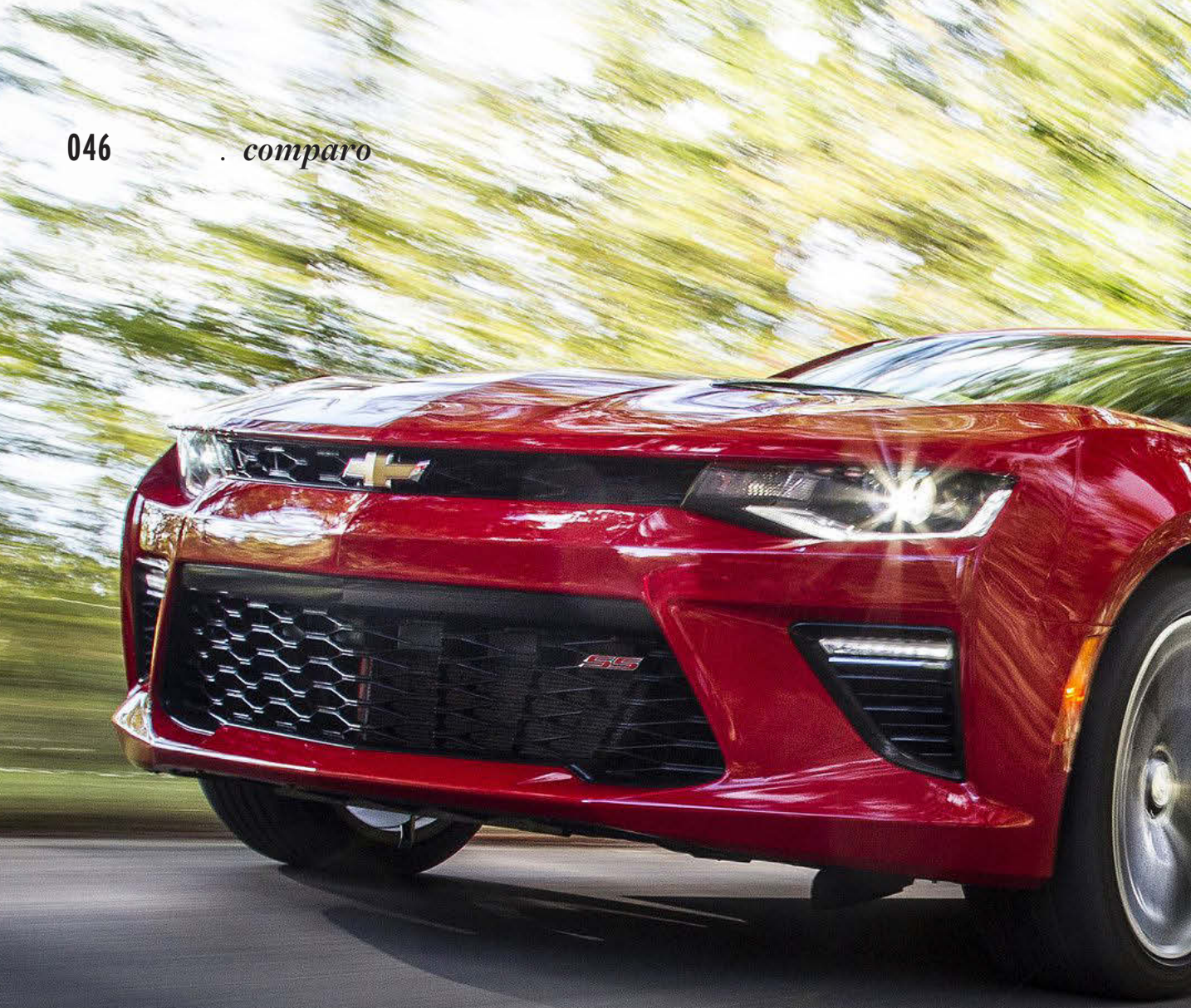
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Chevrolet Camaro SS

PRICE > $47,480 • POWER > 455 hp
TORQUE > 455 lb-ft • WEIGHT > 3760 lb
0-60 MPH > 3.9 sec

Invasive



Ford Mustang GT

PRICE > $43,070 • POWER > 435 hp
TORQUE > 400 lb-ft • WEIGHT > 3817 lb
0–60 MPH > 4.4 sec

Species

TWO ICONS OF AMERICAN MUSCLE DRIVE STRAIGHT PAST THE DRAG STRIP AND DEEP INTO SPORTS-CAR TERRITORY.

by Eric Tingwall
photography by Charlie Magee

There was a time when the American muscle car performed all its tricks with the steering wheel pointed straight ahead. Detroit iron built its image on burnouts, quarter-mile runs, looking fast while parked, and chasing pedestrians out of the crosswalk with a prod of the throttle.

But if it weren't for that V-8 snarl and their burly bodywork, today's muscle cars might pass as legitimate sports cars. America's blue-collar heroes still charge hard in a straight line, but they now corner with the confidence of a European coupe. It's the result of decades-long evolution, but also recent strides in chassis dynamics.

Ford's breakthrough arrived in 2014, just in time for the Mustang's 50th birthday, when engineers included for the first time an independent rear suspension across their entire pony-car lineup. They created the most civilized, the most docile, and the most tossable Mustang outside of the odd be-stallioned track-day special. The 2016 edition is essentially unchanged from the car introduced two years ago, although it has spawned the race-bred Shelby GT350 and GT350R, cars that smear the distinction between juiced-up muscle and flexible sports cars into an indistinguishable blur of racing stripes and eight-cylinder thunder.



IF IT WEREN'T FOR THE V-8 SNARL AND THEIR BURLY BODYWORK, TODAY'S MUSCLE CARS MIGHT PASS FOR LEGITIMATE SPORTS CARS.

As it was in the beginning, so it is now: Just like in the '60s, Ford's Mustang success has Chevrolet playing catch-up with its new Camaro. The Chevy V-8 now turns out an additional 29 horsepower, but it's clear that the engineers directed most of their energy toward the chassis. Reborn on GM's Alpha platform, the new, sixth-generation Camaro uses the same core that forms the basis of the German-baiting Cadillac ATS and CTS. It is lighter and trimmer than the Zeta-platform-based Camaro it replaces and benefits from the suspension and steering expertise that is quickly—and surprisingly—becoming a GM hallmark.

We left the Dodge Challenger on the bench for this test. After its third-place finish in our December 2014 comparison, where a similarly equipped Mustang took the gold, we knew where the Challenger would place in this round. If it wants to run with these two athletes, Dodge needs to cut the fat. The Challenger is more than nine inches longer than either car here and weighs some 400 pounds more.

For this test, the manufacturers provided the top-performing versions of the common man's V-8 muscle car. For Chevrolet, that means a Camaro SS with the 455-hp, 6.2-liter V-8 equipped with magnetorheological dampers ($1695) and the eight-speed automatic transmission ($1495). The $895 dual-mode exhaust doesn't make the car any more powerful, but it delivers a Metallicavian aural assault. The top-tier 2SS trim includes cooled and heated seats, blind-spot monitoring, and ambient interior lighting that can be set to one of 24 colors (one-quarter of which are variations of pink), bringing the total price to $47,480.

Ford brought its 435-hp Mustang GT enhanced with the $2495 Performance pack. That add-on brings a strut-tower brace, revised



suspension tune, a larger radiator, Brembo front brakes, and a limited-slip differential with a shorter final-drive ratio, and it's available only with the manual transmission.

We're beginning to believe that bringing a manual transmission to a drag race these days is akin to handing out Obama stickers at an open-carry meeting, but the manual Mustang actually puts up an admirable fight. In previous testing, the three-pedal version ran dead even with the automatic Mustang GT. The Premium trim makes our test car every bit as upscale as the Camaro, but with a price almost $4500 lower at $43,070.

To give these two increasingly competent corner-hunters a proper challenge, we pointed them toward southeast Ohio, to the Hocking Hills and roads so twisted and rural that you'd suspect them to be dating their cousin.

2. FORD MUSTANG GT

There's nothing else like the Mustang in Ford's U.S. portfolio. It's the lone eight-cylinder car and the only rear-drive vehicle in Dearborn's arsenal that isn't a truck. That's both a blessing and a curse. On the upside, Mustang engineers have the freedom to craft their car without the constraints of shared parts. But neither does the Mustang benefit from the trickle-down economics that comes with building higher-performing Corvettes and more-expensive Cadillacs.

In a vacuum, you could be lulled into thinking that Ford perfected the American muscle car with this Mustang. Freed of its stick axle in back, the original pony car now handles corners and busted concrete with ease. The competent chassis musters 0.94 g of grip around the skidpad and executes a 70-to-zero stop in just 157 feet. The steering effort builds in a linear fashion and offers a

modicum of feedback. The brake pedals in both of these cars are firm and responsive, yet the Mustang's binders start biting earlier with less pedal travel.

But when you start to draw comparisons about those dynamic attributes so essential to driver satisfaction, the Chevrolet exposes the Ford's vulnerable spots; simply put, the Mustang GT is softer than the Camaro SS. The Mustang leans in corners. Under acceleration, the haunches squat and the hood rears back. The slightly slow, fixed-rate 16.0:1 steering hides a small dead spot on-center, and despite wider tires, there's not as much front-end grip as in the Camaro. That makes the Mustang more prone to understeer and less willing to rotate under throttle.

The Mustang rides on nonadjustable dampers, so even though you can toggle through the same four drive modes as those in the Camaro, you can't alter the Ford's roll resistance or ride quality. That said, the single tune of the Performance pack nicely balances ride and handling. Body motions, though large, are always deliberate, never clumsy or inaccurate. Hustling the Mustang over hills and around bends is old-school, organic fun. The Camaro, damping out impacts with minimal body motion and no sacrifice in ride quality, proves that the technology exists to do it better.

With a torque deficit of 55 pound-feet and a redline 500 rpm higher than the Chevrolet small-block's, Ford's 5.0-liter Coyote engine needs to be spun out to keep pace. Its intensity builds exponentially with revs, and, around 4000 rpm, the energy swells in an intoxicating crescendo toward 435 horsepower and the top of the tachometer.







↑ Above: Speak up, son. We can't hear you. The 5.0-liter V-8 at least carries a pretty big stick. Left: Baby seats for baby-sized adults.

Ford Mustang GT

+ A 7000-rpm redline and a willingness to get there, no-gimmicks interior.
− Steering and chassis could be tauter, yacht-rock soundtrack.
− Draws more parallels with a grand tourer than a sports car.

Launched at 3500 rpm, the Mustang GT will break 60 mph in 4.4 seconds and trip the quarter-mile in 13.0. The six-speed stick moves with tight, precise action, but the throws are a touch longer and the effort a bit stiffer than we prefer.

This dual-overhead-cam engine is smoother and more civilized than the Camaro's pushrod V-8, but that doesn't necessarily rank as a positive. For one, the Coyote is too quiet. Even at full throttle, it emits a muffled thrum rather than a visceral yowl. The Camaro gets it right. Its unapologetically lumpy idle and gruff exhaust note are precisely why you didn't spend your $45,000 on a BMW M235i.

If there's one aspect where Dearborn has Detroit handily beat, it's that the Mustang is a much more practical car and far easier to live with on a daily basis. The timeless lines of the Mustang include a taller roof that, combined with a slightly higher seating position, eases ingress and egress. There's excellent outward visibility over the long hood, to either side, and through the rearview mirror. The cabin, aided by a lower beltline, feels much roomier than the Camaro's.

The Mustang's cockpit is a simple place. Considering the headaches that abound inside the Camaro, this is meant as a compliment. The clean, straightforward center stack even offers the perfect array of knobs and buttons to make the imperfect MyFord Touch tolerable. We really only have one complaint about the Mustang's cabin: The turned aluminum that spans the width of the dash is slathered in so much clear coat that it might as well be plastic.







The Ford Mustang effortlessly balances performance, comfort, sport, and practicality. It is a powerful, engaging, and value-packed daily driver. But as a performance car, as a machine designed to provoke exhilaration, the Camaro has it beat.

1. CHEVROLET CAMARO SS

In doubling down on the retro-caricature style of the fifth-generation Camaro, Chevy appears to have designed for the next *Transformers* movie rather than the buyers who will live with the car. Stylists injected steroids into the bodywork and, almost unbelievably, knocked the roof about an inch lower to make the greenhouse even shorter. The stocky Power Wheels proportions suggest that a full-grown human would have to poke his or her head through the sunroof to drive this thing.

A human does fit inside, although you should probably pass on the $900 sunroof to seize precious millimeters of headroom. The Chevy's cabin is far more crowded than the Mustang's, and the form-over-function exterior creates some ergonomic woes

	CHEVROLET CAMARO SS	FORD MUSTANG GT
VEHICLE		
BASE PRICE	$37,295	**$33,295**
PRICE AS TESTED	$47,480	**$43,070**
DIMENSIONS		
LENGTH	188.3 inches	188.3 inches
WIDTH	74.7 inches	75.4 inches
HEIGHT	53.1 inches	54.4 inches
WHEELBASE	110.7 inches	107.1 inches
FRONT TRACK	63.0 inches	62.3 inches
REAR TRACK	62.9 inches	64.9 inches
INTERIOR VOLUME	**F:** 54 cubic feet **R:** 31 cubic feet	**F: 55 cubic feet** **R: 32 cubic feet**
TRUNK	9 cubic feet	**14 cubic feet**
POWERTRAIN		
ENGINE	pushrod 16-valve V-8 376 cu in (6162 cc)	DOHC 32-valve V-8 302 cu in (4951 cc)
POWER HP @ RPM	**455** @ 6000	435 @ 6500
TORQUE LB-FT @ RPM	**455** @ 4400	400 @ 4250
REDLINE/FUEL CUTOFF	6500/6600 rpm	7000/7000 rpm
LB PER HP	**8.3**	8.8
DRIVELINE		
TRANSMISSION	8-speed automatic	6-speed manual
DRIVEN WHEELS	rear	rear
GEAR RATIO:1/ MPH PER 1000 RPM/ MAX MPH	❶ 4.56/6.4/42 ❷ 2.97/9.8/65 ❸ 2.08/14.1/93 ❹ 1.69/17.1/113 ❺ 1.27/22.9/151 ❻ 1.00/28.6/165 ❼ 0.85/33.9/165 ❽ 0.65/44.5/165	❶ 3.66/5.8/41 ❷ 2.43/8.8/62 ❸ 1.69/12.7/89 ❹ 1.31/16.3/114 ❺ 1.00/21.8/153 ❻ 0.65/34.0/164
AXLE RATIO:1	2.77, limited slip	3.73, limited slip
CHASSIS		
SUSPENSION	**F:** struts, coil springs, anti-roll bar **R:** multilink, coil springs, anti-roll bar	**F:** struts, coil springs, anti-roll bar **R:** multilink, coil springs, anti-roll bar
BRAKES	**F:** 13.6-inch vented disc **R:** 13.3-inch vented disc	**F:** 15.0-inch vented disc **R:** 13.0-inch vented disc
STABILITY CONTROL	fully defeatable, traction off, competition mode	fully defeatable, traction off, competition mode, launch control
TIRES	Goodyear Eagle F1 Asymmetric 3 RunOnFlat **F:** 245/40ZR-20 95Y **R:** 275/35ZR-20 (98Y)	Pirelli P Zero **F:** 255/40ZR-19 96Y **R:** 275/40ZR-19 101Y

C/D TEST RESULTS

ACCELERATION		
0-30 MPH	**1.6 sec**	1.7 sec
0-60 MPH	**3.9 sec**	4.4 sec
0-100 MPH	**8.9 sec**	10.5 sec
0-150 MPH	**25.1 sec**	29.0 sec
1/4-MILE @ MPH	**12.3 sec @ 116**	13.0 sec @ 112
ROLLING START, 5-60 MPH	**4.0 sec**	4.8 sec
TOP GEAR, 30-50 MPH	**2.3 sec**	9.1 sec
TOP GEAR, 50-70 MPH	**2.7 sec**	8.6 sec
TOP SPEED	**165 mph** (gov ltd, *C/D* est)	164 mph (gov ltd)
CHASSIS		
BRAKING, 70-0 MPH	**147 feet**	157 feet
ROADHOLDING, 300-FT-DIA SKIDPAD	**0.98 g**	0.94 g
610-FT SLALOM	**43.9 mph**	43.3 mph
WEIGHT		
CURB	**3760 pounds**	3817 pounds
%FRONT/%REAR	53.7/46.3	53.8/46.2
CG HEIGHT	20.5 inches	**20.0 inches**
FUEL		
TANK	**19.0 gallons**	16.0 gallons
RATING	91 octane	91 octane
EPA CITY/HWY	**16/26 mpg***	15/25 mpg
***C/D* 700-MILE TRIP**	**18 mpg**	17 mpg
SOUND LEVEL		
IDLE	**49 dBA**	50 dBA
FULL THROTTLE	91 dBA	**84 dBA**
70-MPH CRUISE	**73 dBA**	74 dBA

tested in Chelsea, Michigan, by **ERIC TINGWALL**



*C/D estimated.







inside. Hang an arm on the windowsill and your elbow rises to ear level. The high trunklid and low roofline squeeze the view out the back into a sliver. Wide B-pillars and the rising beltline render the rear quarter-windows useless. When the feds make blind-spot monitoring mandatory in the coming years, you'll have this car to thank.

There's more natural light entering Guantanamo's solitary cells than the Camaro's cabin, and yet designers struggled to shield the navigation screen from glare. Their inelegant solution tilts the screen toward the floor, an awkward angle that also reflects the faux-metal bezel surrounding the shifter. The panel gaps of the instrument-cluster hood—directly in the driver's line of sight—should make Bob Lutz weep. And when the interior-design team ran out of room up front, they simply used the real estate in the rear. The map pockets in the doors and the wireless phone-charging pad are effectively in the back seat.

Despite the voodoo ergonomics, the new Camaro's interior is still a massive improvement over the outgoing car's. The materials belong in an actual motor vehicle with a considerable price, as opposed to a toddler's toy, and the switchgear is both attractive and easy to use. A digital screen in the binnacle between the analog gauges is packed with useful information, and the nav-screen graphics are crisp. Honestly, though, this cabin could be trimmed in cellophane and crayon markings and we'd still gush over the way the car drives.

Chevrolet Camaro SS

+ Corners as well as it accelerates, small-block snarl.
− Concept-car design wreaks havoc on the cabin, the options you want aren't cheap.
= Rippling with American muscle, but as sophisticated as European iron.

↑ Top: Even with narrower front tires, the Camaro has greater front-end grip. Above: Gun-slit side windows are too small for big guns.



While the new car looks stockier, the switch to the Alpha platform trimmed 2.3 inches in length and roughly 100 pounds as equipped for this test. The high cowl means you can only guess at where the corners of the body stop, but that's less of an issue since the new Camaro drives like a much smaller car. That's a stark contrast with its predecessor, which felt as if it grew in size the more carefully you tried to place it on the road.

There's a precision in the Camaro's handling that until now was reserved for track-oriented models such as the Z/28 and Mustang Boss 302. Credit the same chassis integrity that's baked into the Cadillac ATS and CTS; Chevy says structural rigidity is improved by 28 percent over the last-gen car's. The magnetorheological dampers hold the fenders level in corners and relax the ride on the highway. The electrically assisted power steering reacts to minute on-center tweaks and tightens the car's line with a ratio that quickens as you wind in lock. There are touring, sport, and track modes,







★ FINAL RESULTS

RANK		1 Chevrolet Camaro SS	2 Ford Mustang GT
		Maximum points available	
VEHICLE			
DRIVER COMFORT	10	7	**8**
ERGONOMICS	10	7	**8**
REAR-SEAT COMFORT	5	1	**2**
REAR-SEAT SPACE*	5	**5**	**5**
TRUNK SPACE*	5	3	**5**
FEATURES/AMENITIES*	10	**10**	8
FIT AND FINISH	10	7	**9**
INTERIOR STYLING	10	**8**	**8**
EXTERIOR STYLING	10	8	**9**
REBATES/EXTRAS*	5	0	0
AS-TESTED PRICE*	20	18	**20**
SUBTOTAL	100	**74**	**82**
POWERTRAIN			
1/4-MILE ACCELERATION*	20	**20**	17
FLEXIBILITY*	5	**5**	4
FUEL ECONOMY*	10	**10**	9
ENGINE NVH	10	**10**	9
TRANSMISSION	10	8	**9**
SUBTOTAL	55	**53**	**48**
CHASSIS			
PERFORMANCE*	20	**20**	18
STEERING FEEL	10	**9**	8
BRAKE FEEL	10	**9**	**9**
HANDLING	10	**10**	9
RIDE	10	**9**	**9**
SUBTOTAL	60	**57**	**53**
EXPERIENCE			
FUN TO DRIVE	25	**23**	22
GRAND TOTAL	240	**207**	**205**

** These objective scores are calculated from the vehicle's dimensions, capacities, rebates and extras, and/or test results.*

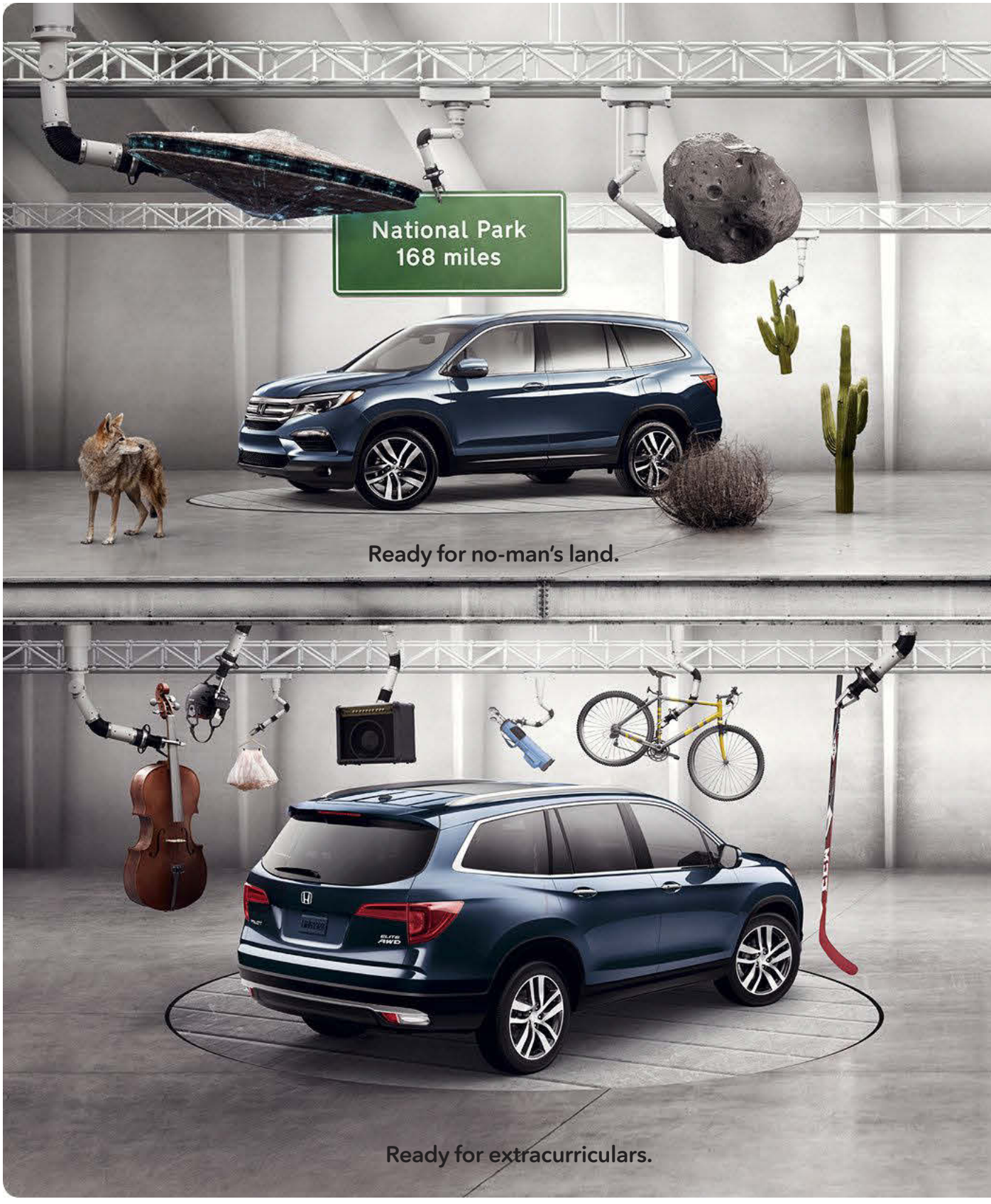
Shell V-Power NiTRO+ Premium Gasoline
The Official Fuel of CAR AND DRIVER

plus a weather setting to appropriately finesse the steering effort, dampers, transmission mapping, and stability control. You can also lock the steering and shocks into your preferred setting regardless of the mode. We favor the lightest, most natural steering weight that comes with touring. Regardless of the drive mode, the Camaro follows a path earnestly and intuitively. Its best virtues are symbolized by a wonderfully sculpted, flat-bottomed steering wheel.

Not that the 6.2-liter LT1 V-8, imported from the Corvette Stingray with only minor changes, is any slouch. The small-block's torque peak of 455 pound-feet comes 150 rpm higher than the Mustang's, but it fills in the lower half of the tach with palpably more grunt. From idle to 6600 rpm, it sounds as if its gargling 91 octane and spitting pure anger out the tailpipe. There's a smart side to this Detroit legend, too. Direct injection, variable valve timing, and the ability to run on only four cylinders when paired with the automatic gearbox helped the Chevy extract 1 additional mpg over the Ford's smaller-displacement engine.

With lower weight, higher power, more gears, and greater grip, the Camaro walked all over the Mustang in our performance testing. Goodyear Eagle F1 rubber helps produce a Porsche-like 147-foot stopping distance and lateral grip that flirts with 1.0 g. While it favors understeer in most situations, the Camaro was far more wieldy running through the slalom, pivoting better than the Mustang under acceleration and deceleration. In a straight line, breaking four seconds to 60 mph put the Chevy half a second ahead of the Ford, a gap that grew to 0.7 second by the end of quarter-mile.

The Camaro's Corvette powertrain and Cadillac chassis are some of the best parts in GM's storerooms. The Camaro SS rockets to triple-digit speeds and whips around corners with poise. It's the small-block–powered ATS-V that Cadillac will never build, yet it costs almost $20,000 less than the turbo ATS-V that it does. This Camaro defines an era where the eight-cylinder American muscle car is more than cheap power and brash styling. But it hasn't forgotten the cheap power or the brash styling.



The all-new, ready-for-anything, 2016 Honda Pilot Elite.

With Intelligent Traction Management for diverse conditions and adaptable seating arrangements for any situation.

Pilot Elite shown. © 2015 American Honda Motor Co., Inc.



HONDA

"WHERE TO THIS MORNING, BOSS? AND WILL YOU NEED THAT JACKET PRESSED?"

— BMW 750i xDRIVE

BMW ENGINEERS A 7-SERIES THAT'S MORE BUTLER THAN CAR.

BY JARED GALL

Never mind what you think you see here. This is not a car as we know it. Yes, you can drive it—or it can drive for you during your 15-second catnap. It will perfume the air you breathe and draw the shades if the sun is too bright. It can recline your seat, clear the space ahead, and deploy an ottoman. Approach the car and it'll roll out what BMW calls a "Light Carpet," an LED-projected runway welcoming you. It'll remind you of speed limits, but wouldn't dare suggest you obey them. And when you reach your destination, it will park for you, or just act as spotter if you prefer to do it yourself. It'll even stomp on the brakes if you don't see an obstacle and get too close. The new BMW 7-series isn't just a car. It's a concierge, a four-wheeled passe-partout.





PHOTOGRAPHY BY ROY RITCHIE

Here, in the concierge class, luxury means something more than just highly adjustable and supremely comfortable ventilated leather seats, which, of course, this 750i xDrive has in both the front and rear. Or a high-end stereo system, which in this case is a Bowers & Wilkins with 1400 watts and 16 speakers that include Kevlar midranges and "diamond tweeters with Nautilus technology," a description that probably took longer to write than it takes to manufacture lesser speakers. BMW chief designer Karim Habib says modern luxury means "offering the customer what they want before they know they want it."

Which is why, like any proficient attendant, the 7-series now responds to hand gestures such as waves, points, and impatient finger twirls. A dismissive flick of the wrist ignores incoming calls. Pointing at the infotainment screen accepts them. Twirling your finger clockwise in front of the screen turns up the volume; counterclockwise turns it down. A two-fingered point can be programmed to do any number of things: set a specific destination, play "After All" by Cher and Peter Cetera from a connected phone, play other songs less terrible.

Where Habib sees a luxury feature, we see a gimmick. But if you don't like Gesture Control, you don't have to use it. With the addition of touchscreen control and an optional tablet between the rear seats, there are now five ways to interact with the 7-series's iDrive infotainment system (the knob and voice commands being the other two). The race to incorporate mind control is on, however our bet is on dark horse—or would that be space horse?—Tesla.

Few earthbound vehicles boast such diverse and high-tech construction as the new 7-series, with the 2016 model representing the auto industry's most mainstream application yet of structural carbon fiber [see "Material Girl," page 060]. BMW says it trimmed 88 pounds from the 7's unibody, and the example tested here weighed 4883 pounds, more than 100 pounds lighter than the previous-generation 750i xDrive we had for a long-term test.

All the major suspension components are adjustable. Air springs tweak the ride height based on load, speed, and vehicle setting. Adjustable dampers and anti-roll bars vary the ride between soft and firm. The newly available Active Comfort Drive with Road Preview adjusts chassis systems according to data drawn from the navigation system. Not even the rear-wheel toe angle is fixed, as BMW's rear steering is available for the first time with four-wheel drive. But within the panoply of settings, modes, and choices, is there one that delivers the sensations we expect of a BMW?

Yes. Sort of. Depending on the suspension mode—comfort plus, comfort, or sport—it can be a Rolls, a Benz, or a BMW. Comfort plus, the squishiest, allows for surprising float, with the car leaning wildly in turns. We can't imagine many roundel loyalists engaging that one, but it might ease the transition for any unfortunates forced to downgrade from BMW's super-lux British subsidiary. Comfort mode can still rock a baby to sleep but is unlikely to induce seasickness. Sport is the true BMW setting, nicely balancing control with comfort. In it, suspension and body motions are firmly damped, but without an overly sporting edge. This is, after all, a car with an optional rear-seat package aimed at chauffeured buyers. The Jaguar XJ and even the Audi A8 are firmer, but we question to what extent buyers at this price point need their long-wheelbase sedan to behave like the M3 they park next to.

And either way, 0.88 g on the skidpad is respectable for a vehicle that can indulge in such un-BMW behavior in comfort-plus mode. The steering is responsive and linear but light on feel, which engineers tell us is intentional. We enthusiasts might think the 7 should be an XXXL M235i, but the people who buy them think otherwise,

BMW 750i xDRIVE

+ ALTERNATELY CODDLING AND THRILLING, INCORPORATES EVERY LUXURY FEATURE IMAGINABLE–AND SOME THAT ARE PURE FANTASY.
− SO COMPLICATED THAT YOUR SALESMAN FOLLOWS UP TO ENSURE YOU UNDERSTAND HOW TO USE IT.
= AN EXCELLENT CHOICE FOR HIGH ACHIEVERS NOW REQUIRES A MASTER'S DEGREE ITSELF.

MORE TO THE POINT

Point an index finger straight up and twirl it around and it's a nonverbal "la-di-da." Aim that gesture at your own head and it implies someone is cuckoo. Hold it out in front of you while someone else is talking and it says, "Move it along." But direct it at your 7-series's center screen and it becomes an imprecise way of turning up the volume (how many twirls for a two-click volume increase?), a physical control for which is already at the tip of your thumb while your hands are at rest on the steering wheel. More than the redundancy, though, it's Gesture Control's limited vocabulary that makes it feel contrived, and so we suggest BMW broaden the functionality to include more tasks:

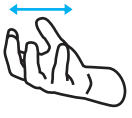

Engage M warp drive, overboost function generating 600 horsepower


Self-park in garage


Adjust music to indicated tempo


Full system check


Navigation set to Texas


Engage massaging seat


Navigation set to nearest heavy-metal festival [Note: system confusion likely; voice-control inputs recommended]


Perform J-turn


Alternative parking controls [baton with Dakota leather grips, $350; Merino leather grips, $775]


Navigation set to nearest hospital; driver's wrist is broken

ILLUSTRATIONS BY MARTIN LAKSMAN





Any buttons that look like metal actually are. They're cool when it's cold out, warm when it's hot, and they'll melt your fingerprints during summertime in Arizona. The ceramic trim on the iDrive, HVAC, and stereo knobs is part of the $3200 Executive package.









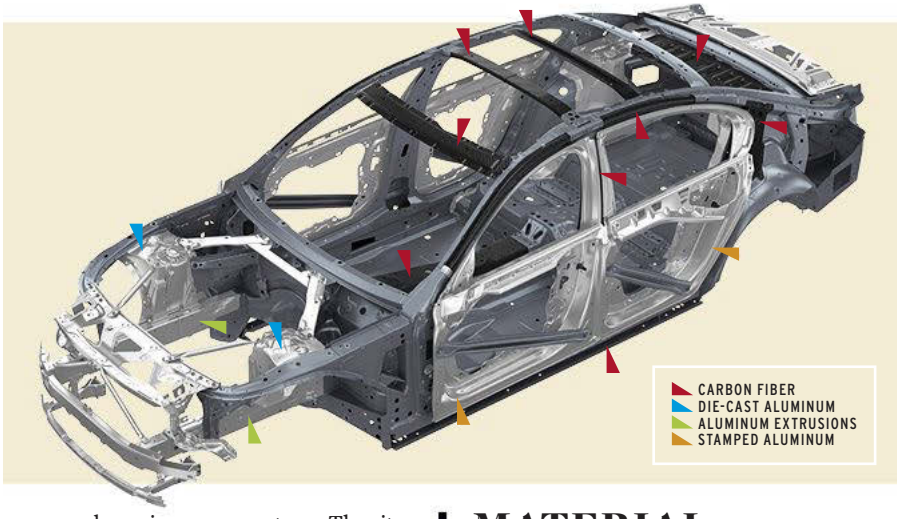




finding bothersome the little twitches and tugs emblematic of good steering. And if the car feels closer to a Mercedes S-class than any BMW, maybe that's because the S-class outsells the 7-series two to one. If you can't beat 'em, join 'em, correct? But BMW has always provided good brakes, and whether it's the driver who slams on them or the car's computer, the 750i stops from 70 mph in just 161 feet—impressive considering its mass. The pedal is progressive, but rather soft.

Despite funneling most of the R&D money into the gadgets, gizmos, and gimmicks department, BMW reserved enough to let the powertrain guys throw a nice spaetzle party. The 750i's 4.4-liter twin-turbo V-8 gets revised intake and exhaust manifolds, plus a half-point bump in compression ratio, from 10:1 to 10.5:1. Twin-scroll turbos replace the single-scroll units used in the old car. Output stands pat at 445 horsepower and 480 pound-feet of torque, but efficiency increases, with highway fuel economy bumping up 1 mpg, to 25. The city rating is frozen at 16. It's a strong, smooth engine, and with a ZF eight-speed automatic shuffling the gears and xDrive sending power to all four wheels, we hit 60 mph in 4.4 seconds—only 0.4 second behind an M5 manual. It blitzed the quarter in 12.8 at 112 mph.

BMW says the transmission is updated to interface with the nav system and tweak shift strategy based on the terrain. Without an equivalent reference car lacking the system or any dramatic grades to climb, it was impossible to tell if the transmission was downshifting because we were braking into a corner, because the nav system told it a turn was approaching, or because it was accounting for migratory behavior of



MATERIAL GIRL

Carmakers live in a material world. They must choose metals and composites capable of delivering light, stiff car bodies at a reasonable cost. But instead of following the aluminum-intensive precedents set by Audi, Jaguar, Mercedes-Benz, and Porsche, BMW is pushing a new structural concept it calls "Carbon Core" for its sixth-generation 7-series sedan.

While this new flagship's unibody is composed mainly of welded high-strength steel stampings, BMW says it is 88 pounds lighter and notably stiffer than its predecessor. Lessons learned from the i3 and i8 science projects are behind the 15 carbon-fiber-reinforced moldings applied to high-stress areas [see illustration]. Tubular arches tucked neatly inside the windshield and door-opening framework are the most interesting composite parts.

But there's ample aluminum here, too, including the extruded longitudinal chassis members, the die-cast spring seats, the brake-rotor hats, and the stampings for the hood, decklid, and doors. A magnesium space frame supports the instrument panel and steering column, and the front fenders are plastic.

So it's as light as a Mazda Miata? No. But such strict dieting is what allowed BMW to gorge on creature comforts and advanced driver aids.

BMW 750i xDRIVE

▼ SPECIFICATIONS

PRICE
AS TESTED $129,245
BASE $98,395

VEHICLE TYPE: front-engine, 4-wheel-drive, 4-passenger, 4-door sedan
OPTIONS: rear executive lounge seating, $5750; Autobahn package, $4100; Luxury Cold Weather Seating package, $3900; sound system, $3400; Executive package, $3200; night-vision system, $2300; Driver Assistance Plus, $1900; Interior Design package, $1800; Active Driving Assistance Plus, $1700; 20-inch wheels, $1300; panoramic sky lounge LED roof, $900; Ambient Air package, $350; Display Key, $250
STANDARD: power windows, seats, locks, and sunroof; remote locking; cruise control; tilting and telescoping steering wheel
AUDIO SYSTEM: satellite radio, CD player, 20.5-gigabyte media storage, USB and Bluetooth-audio inputs, 16 speakers

ENGINE
twin-turbocharged and intercooled V-8, aluminum block and heads
BORE X STROKE ... 3.50 x 3.48 in, 89.0 x 88.3 mm
DISPLACEMENT ..... 268 cu in, 4395 cc
COMPRESSION RATIO 10.5:1
FUEL DELIVERY SYSTEM ..... direct injection
TURBOCHARGERS ..... Honeywell MGT2256
MAXIMUM BOOST PRESSURE ..... 18.9 psi
VALVE GEAR: double overhead cams, 4 valves per cylinder, hydraulic lash compensation, variable intake- and exhaust-valve timing and intake-valve lift
REDLINE/FUEL CUTOFF ..... 7100/6500 rpm
POWER ..... 445 hp @ 6000 rpm
TORQUE ..... 480 lb-ft @ 1800 rpm

DRIVETRAIN
TRANSMISSION ..... 8-speed automatic with manual shifting mode
FINAL-DRIVE RATIO 2.81:1
4-WHEEL-DRIVE SYSTEM ..... full time with automatic front-axle engagement

GEAR	RATIO	MPH PER 1000 RPM	MAX SPEED IN GEAR (rpm)
1	5.00	5.7	37 mph (6500)
2	3.20	8.9	58 mph (6500)
3	2.14	13.2	86 mph (6500)
4	1.72	16.5	107 mph (6500)
5	1.31	21.6	140 mph (6500)
6	1.00	28.4	155 mph (5450)
7	0.82	34.5	155 mph (4500)
8	0.64	44.3	155 mph (3500)

CHASSIS
unit construction with a rubber-isolated rear subframe
BODY MATERIAL: steel and aluminum stampings, injection-molded plastic, molded carbon fiber

STEERING
rack-and-pinion with variable ratio and variable electric power assist
TURNS LOCK-TO-LOCK 2.2
TURNING CIRCLE CURB-TO-CURB ..... 42.3 ft

SUSPENSION
F: ind; 1 control arm, 1 diagonal link, and 1 lateral link per side; air springs; 4-position cockpit-adjustable electronically controlled dampers; variable anti-roll bar
R: ind; 2 diagonal links, 2 lateral links, and a tie rod per side; air springs; 4-position cockpit-adjustable electronically controlled dampers; variable anti-roll bar

BRAKES
F: 15.5 x 1.4-in vented disc
R: 14.5 x 1.1-in vented disc
STABILITY CONTROL ..... fully defeatable, traction off

WHEELS AND TIRES
WHEEL SIZE/CONSTRUCTION ..... **F:** 8.5 x 20 in, **R:** 10.0 x 20 in/cast aluminum
TIRES ..... Bridgestone Potenza S001 **F:** 245/40R-20 99Y **R:** 275/35R-20 102Y

EXTERIOR DIMENSIONS
WHEELBASE ..... 126.4 in
LENGTH ..... 206.6 in
WIDTH ..... 74.9 in
HEIGHT ..... 58.2 in
FRONT TRACK ..... 63.4 in
REAR TRACK ..... 64.6 in
GROUND CLEARANCE ..... 5.3 in

INTERIOR DIMENSIONS
SAE VOLUME ..... **F:** 57 cu ft **R:** 58 cu ft
TRUNK ..... 18 cu ft









Above, clockwise from left: You can't play Game of War on the Display Key yet. Backup camera looks like a video game but turns off above crawling speed. In chauffeur mode, kick back and—hey, will someone jailbreak this tablet already? For now, driving still requires human attention.

Pacific orca pods and trending celebrity gossip. Whatever input it's considering, the ultra-wide eight-speed is seamless and quick to snatch the right gear when it decides it's in the wrong one.

Even the key is something special. The optional Display Key ($250) incorporates a small screen on which the driver can check to see if the doors were left unlocked or the windows down, or how long it is until the next scheduled oil change. Our challenge to BMW engineers: Link the key to various household appliances so owners will know if they've left the oven on or the curling iron plugged in. If all of that sounds frivolous, know that the key has a second battery to control essential items such as the door locks and starting the car.

The Display Key was the least expensive single item in our test car's $30,850 options bill. The tab also included three different packages costing a combined $12,850 that cut the seating capacity from five to four and added heating, ventilation, and massage—plus heated armrests—in all four positions; video screens on the front-seat backrests; and a removable tablet allowing rear-seat passengers near-full control over the car's systems. Driver-assistance systems, including self-parking and the semi-autonomous Active Driving Assistant Plus, which will perform all necessary driving tasks so long as the driver's hands remain on the wheel, tallied another $7700. Luxury, appearance, and technology features made up the remainder.

It's no coincidence that BMW is introducing what it calls Encore Delivery with the new 7-series. The Encore is a visit buyers schedule post-delivery where a BMW representative explains how to use any functions of their new car that they haven't yet figured out. If only the car would drive itself for longer, the driver would have more time to study. When the day comes that it can, it won't just be for safety or traffic-flow reasons. It'll be because we ran out of other things for our wheeled butlers to do.

CAR AND DRIVER *TEST RESULTS*

ACCELERATION

ZERO TO	SECONDS
30 MPH	1.9
40 MPH	2.6
50 MPH	3.3
60 MPH	**4.4**
70 MPH	5.4
80 MPH	6.7
90 MPH	8.3
100 MPH	**10.1**
110 MPH	12.1
120 MPH	14.6
130 MPH	17.5
140 MPH	20.9
150 MPH	25.3
ROLLING START, 5-60 MPH	5.2
TOP GEAR, 30-50 MPH	2.7
TOP GEAR, 50-70 MPH	3.4
1/4-MILE	**12.8 sec @ 112 mph**
TOP SPEED *(GOV LTD)*	155 mph

TEST NOTES: *xDrive is adept at eliminating wheelspin during launch. Thanks in part to its carbon-fiber content, this BMW's center of gravity is two inches lower than the last Mercedes S550 we tested.*

WEIGHT

CURB	4883 lb
PER HORSEPOWER	11.0 lb
DISTRIBUTION	**F:** 52.6% **R:** 47.4%
CENTER-OF-GRAVITY HEIGHT	21.0 in
TOWING CAPACITY	0 lb

BRAKING, 70-TO-ZERO MPH

FIRST STOP	164 ft
SHORTEST STOP	**161 ft**
LONGEST STOP	164 ft
FADE RATING	NONE

TEST NOTES: *Stopping performance is exemplary with pressure-sensitive response and no fade. Pedal feel is, however, soft.*

HANDLING

ROADHOLDING, 300-FT-DIA SKIDPAD	**0.88 g**
UNDERSTEER	MODERATE

TEST NOTES: *To help its large, heavy flagship feel light and agile, BMW has blessed the new 7-series with variable-assist power steering, variable anti-roll bars, and rear-wheel steering.*

FUEL

CAPACITY	20.6 gal
OCTANE	91 recommended
EPA CITY/HWY	16/25 mpg
***C/D* OBSERVED**	**16 mpg**

INTERIOR SOUND LEVEL

IDLE	38 dBA
FULL THROTTLE	72 dBA
70-MPH CRUISING	68 dBA

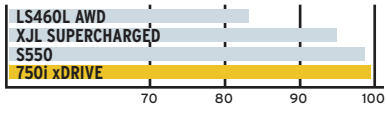
tested by ERIC TINGWALL *in Chelsea, Michigan*



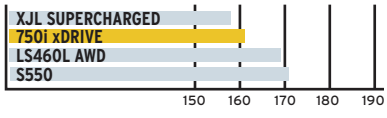
COMPETITORS

BMW 750i xDRIVE *(4.4-LITER V-8, 445 HP, 8-SP AUTO)*
JAGUAR XJL SUPERCHARGED *(5.0-LITER V-8, 470 HP, 8-SP AUTO)*
LEXUS LS460L AWD *(4.6-LITER V-8, 386 HP, 8-SP AUTO)*
MERCEDES-BENZ S550 *(4.7-LITER V-8, 449 HP, 7-SP AUTO)*

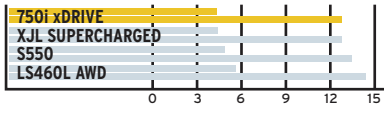
CURRENT BASE PRICE *dollars x 1000*
Includes freight and performance options.



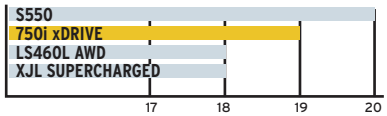
70-0 BRAKING *feet*



ACCELERATION *0-60 & 1/4-mile, seconds*



FUEL ECONOMY *EPA combined, mpg*



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TOP GROUPED PHOTOGRAPHY BY MICHAEL SIMARI



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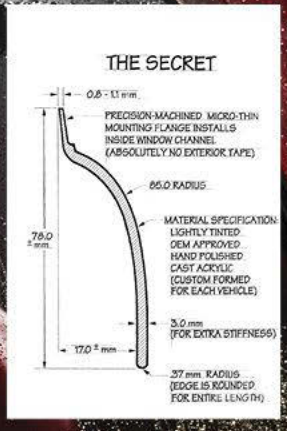
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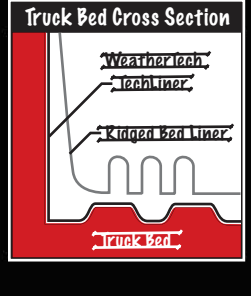
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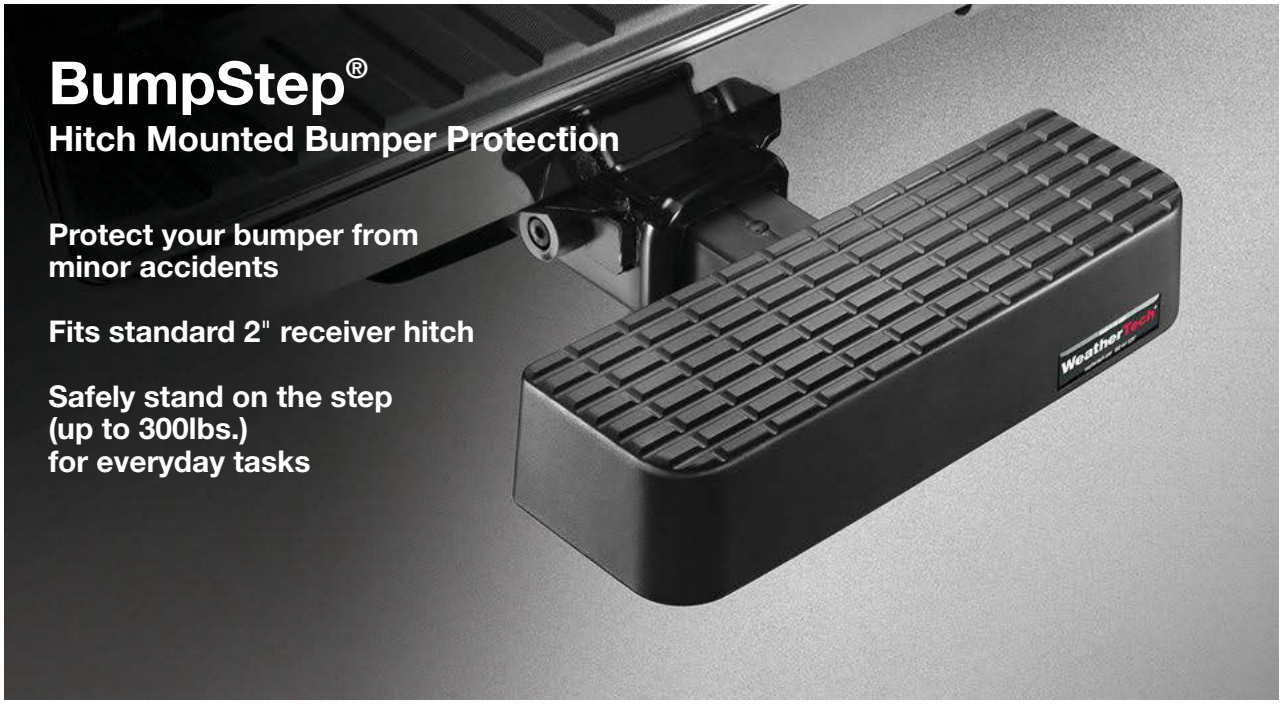
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COLD WAR

To find the season's best studless snow-and-ice tire, we head north. Really quite far north. *by K.C. Colwell*

Assuming you don't read Suomi, the language of Finland that sounds like a mashup of Dutch and Klingon, there are few road signs you will understand when you're 186 miles above the Arctic Circle. But one announcing that Murmansk, Russia, is 188 miles away gets your attention, reminding you just how far north you are. Murmansk is a Cold War relic on the Arctic Ocean—to Soviet submarine warfare what Cape Canaveral is to spaceflight. These days, the Russian Northern Fleet occasionally moors nearby.

Then another sign we can read pops up on the left: "Test World Oy." Oh yeah, we're here to test some winter tires. Murmansk will have to wait. We have a cold war of our own to deal with.

The Test World Mellatracks proving grounds is a facility that offers year-round testing on natural snow, as opposed to the man-made stuff. During winter months it operates like any other automotive proving grounds, but with frozen canals and snow-packed fields stand-

photography by **TOM SALT**


Ford
NJF·7



THIS SYMBOL ON A TIRE'S SIDEWALL INDICATES THAT IT MEETS OR EXCEEDS THE RUBBER MANUFACTURERS ASSOCIATION'S STANDARDS FOR SNOW GRIP. IF THIS ISN'T ON THE SIDEWALL, IT ISN'T A GENUINE WINTER TIRE.

ing in for the concrete and asphalt you find at more-temperate venues. In early spring, Test World stockpiles snow, filling its two buildings with about two feet of packed, natural white stuff, enough to last the entire indoor-testing season. We headed up to the refrigerated covered complex in late summer, as we wanted this story to appear in time for you to take advantage of its findings for the winter soon to be upon us.

Only 25 percent of snowbelt drivers fit their vehicles with winter tires, while Quebec and many European countries make them compulsory.

The Indoor 1 building is a 525-foot-by-52-foot pole barn of packed snow that includes a lane of Zamboni-maintained ice. Indoor 2 contains a 0.2-mile, 30-foot-wide squiggly handling circuit. Both buildings have cooling circuits in the floor and chilled forced-air ductwork. On our test day, the inside thermometer read -11, as in degrees Celsius, or 12 degrees Fahrenheit.

Indoor 1's maximum speed is relatively slow: Braking tests on snow and ice are from 18 and 16 mph, respectively, down to 3 mph. The acceleration tests are just the opposite. Eliminating the zero-to-3-mph range for both going and stopping is a way to test around widely varying performance at low speeds on low-friction surfaces, attributable to differences in driver inputs as well as ABS behavior.

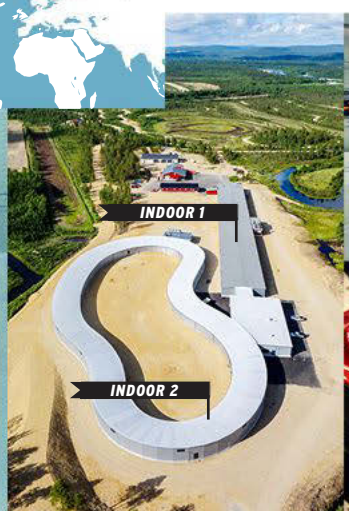
Indoor 2 is where the real fun happens. From the air, it looks like a giant hollow Jelly Belly. Its top speed of 45 mph on snow feels like triple digits in the dry. Get a corner wrong or slide too much and you'll hit a strategically placed snowdrift, there to catch the car before the Armco does. Because "Indoor 2 subjective handling test" is a mouthful, we'll just call it the "snowcross" test. Between each tire session, a maintenance crew resurfaces the snow to keep conditions as constant as possible. Also, a control tire laps periodically to normalize results if the track becomes faster or slower.

For this test we wanted to determine the best-performing studless snow-and-ice tire. As with past tire tests, we deferred to experienced drivers, this time supplied by Test World, for the objective acceleration and braking on snow and ice. We also part-



THE FACILITY WE USED FOR THIS TIRE TEST, THE APTLY NAMED TEST WORLD MELLATRACKS, SITS ROUGHLY 186 MILES NORTH OF THE ARCTIC CIRCLE IN LAPLAND, OUTSIDE THE TINY TOWN OF IVALO.









nered with our hosts for the subjective evaluation conducted on the indoor snowcross circuit and measured in lap times. Our mule was one of Test World's Ford Focuses fitted with 225/45R-17 rubber.

These tires rely on their construction, rubber compounds, tread design, and what occasionally feels like magic to generate grip at the contact patch. Almost all tire manufacturers make a tire in this category, which is targeted mostly at family sedans and hatches. But we limited our testing to the heavy hitters: tires from Bridgestone, Continental, Dunlop, Michelin, Nokian, and Yokohama.

Only 25 percent of snowbelt drivers fit their vehicles with winter tires, while Quebec and many European countries make their use compulsory. This tire war won't have the impact of the real Cold War, but if you are among the three-quarters of drivers who don't use a set of cold-weather tires, we hope to change your thinking.







YOUR BEST FOOT BACKWARD

No one recommends you install just two winter tires. If you must for reasons of cost, though, the conventional wisdom is that you want the best shoes (or the least worn) in the rear no matter if you have a front-, rear-, or four-wheel-drive vehicle. To confirm or bust this bias, we mixed two sets of Michelin tires, winter and all-season [see "Seasoned Perspective," right], and ran a few laps of the snowcross with the all-seasons in front and the winters on the back, then vice versa. Conclusion: Putting the winter tires on the front wheels was a lot more fun. Not only was the grip-in-front car easier to steer and brake, it was also 3.2 seconds quicker around the little circuit at Test World. But that lap came with a wallop of oversteer, the kind of rear-end looseness that would catch most drivers out and toss them right into the ditch. Putting the winter tires at the rear yielded stubborn understeer, which is way more predictable than the alternative. So if you're going to mix tires, for safety's sake put your best rubber at the rear.



THE INDOOR ENVIRONMENT LENDS AN EXTRA FRISSON OF EXCITEMENT TO A WINTER'S DRIVE.

AERIAL PHOTOGRAPH COURTESY TEST WORLD



SEASONED PERSPECTIVE

You may think you don't need winter tires because your car has all-seasons. But, ironically, if you live somewhere that actually has all the seasons, you need winter tires. For perspective on this issue, we asked Michelin for a set of all-seasons, and it sent over its Pilot Sport A/S 3. If we were going to buy an all-season tire, it would be this one, because it actually has some serious dry grip in summer conditions. But as good as it is, the Pilot Sport was nearly six seconds off the Nokian's pace on the snowcross, and it didn't come close to any of the winter tires' braking performances. On the snow, it took five feet more to stop than the average of the six winter tires on the following pages. Five feet may mean the difference between a fender bender and an accident-free winter. Braking distances on snow may be the best reason to fit a set of winter tires, and Inuit stoplight drag racers would do well to note the extra second of acceleration from 3 to 18 mph.

MICHELIN

Pilot Sport A/S 3

SERVICE DESCRIPTION: **91Y**
LOAD: **Standard**
TREAD DEPTH, IN: **10.5/32**
PRICE PER TIRE: **$144**



Test Results

SNOWCROSS LAP TIME: **35.25 sec**
SNOW ACCELERATION, 3–18 MPH: **4.48 sec**
SNOW BRAKING, 18–3 MPH: **38.3 ft**
ICE ACCELERATION, 3–16 MPH: **11.99 sec**
ICE BRAKING, 16–3 MPH: **52.6 ft**



6. YOKOHAMA

iceGUARD iG52c

SERVICE DESCRIPTION: **91T**
LOAD: **Standard**
TREAD DEPTH, IN: **11/32**
PRICE PER TIRE: **$126**



–

Last place in this test is like coming in sixth place in the Olympics. Yes, there are better performers, but this rubber is still pretty amazing. The iceGUARD iG52c is far better in winter conditions than any all-season tire on the road.

The iceGUARD's largest point loss came on the snowcross [see p. 075], where it showed the very desirable trait of progressiveness—turning and braking in a linear manner. It's a calm tire, never losing or gaining grip unpredictably. That said, the iG52c's overall lack of maximum traction put it nearly two seconds behind the quickest tire in the snowcross, which is a massive gap on a 30-second track.

It also fell short in the straight-line tests, taking the fewest points in all but ice acceleration, where it barely nudged the fifth-place Dunlop. The gaps in this test are, for the most part, small because of the slow speeds; they would grow exponentially with pace.

The biggest thing the iG52c has going for it is price. It's the least expensive tire in the test. Many balk at the cost associated with winter tires; not just the rubber but the fitting or the second set of wheels. That winter-tire use extends the life of summer tires is often overlooked. Sure, soft winter compounds wear faster than summer or all-season tires, but the benefits are well worth the investment, no matter which winter tires you purchase, including this Yoko.



5. DUNLOP

Winter Maxx

SERVICE DESCRIPTION: **94T**
LOAD: **Extra**
TREAD DEPTH, IN: **12/32**
PRICE PER TIRE: **$134**



–

Unlike every other tire in this test, the Dunlop Winter Maxx has an asymmetrical tread pattern, meaning that, as opposed to a directional tire, it has dedicated inner and outer tread blocks. Winter tires produce more road noise than summer tires, and asymmetrical designs are usually quieter. But asymmetrics are mostly reserved for the "performance winter" class, where there's more emphasis on a tire's dry abilities.

We're not sure its design led to this tire's near-basement finish, but the straight-line objective tests don't lie, and finishing last in three out of four tests is too much to overcome. The worst score came in ice acceleration, with the Dunlop trailing 1.29 seconds behind the winner. The Dunlop's snow braking is impressive, however, with a distance just half a foot longer than the Bridgestone and Nokian.

Somehow, with the worst score in all the objective tests but snow braking, the Maxx still turned a pretty quick lap, 29.74 seconds, nearly tying the second-place finisher. Of note: When surpassing the limit in a corner, the Dunlop required some patience in its recovery, and there is a pronounced delay from input at the wheel or pedals to reaction at the surface.

Each Winter Maxx is $8 more than the Yokohama. If you're on a budget and averse to road noise, it's worth considering the Winter Maxx. But if you want more performance, keep reading.



4. BRIDGESTONE

Blizzak WS80

SERVICE DESCRIPTION: **91H**
LOAD: **Standard**
TREAD DEPTH, IN: **12/32**
PRICE PER TIRE: **$160**



–

Blizzak is a familiar name, synonymous with winter-rubber excellence. We've been putting WS-series Blizzaks, starting with the WS15, on our long-term cars since the product line came to the U.S. in 1993. Thus, the WS80's fourth-place finish shocked us.

Fortunately, the WS80's major highlight is one of the more desirable traits for a winter tire: stopping in the snow. A large part of snow traction, specifically longitudinal accelerating and braking, comes from snow building up and packing in the tread. The resulting snow-on-snow contact increases grip, allowing the WS80 to tie our winner in snow braking. Hydrophilic passages, or holes in the tread that remove the microscopic layer of water that exits on ice, helped the WS80 tie the Conti at midpack for ice-braking scores.

Unfortunately, the WS80 posted the second-slowest snowcross time. We thought it had some of the worst at-the-limit behavior by abruptly losing grip with little progressivity and a lengthy recovery time.

Bridgestone says it invests more than $1 billion a year in research and development, and winter tires are a big part of that. But there is a noticeable step up in performance from fourth to third in this test, and we hope Bridgestone's engineers will close the gap with the next-generation WS.

DANIEL STEIGER



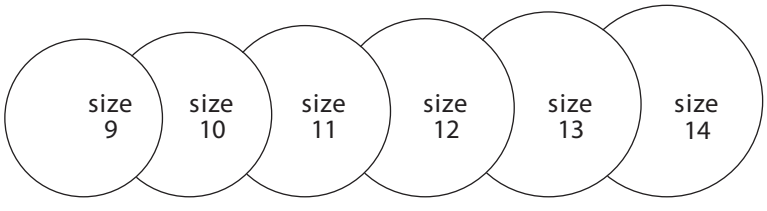
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3. CONTINENTAL

WinterContact Si

SERVICE DESCRIPTION: **94H**
LOAD: **Extra**
TREAD DEPTH, IN: **10/32**
PRICE PER TIRE: **$131**



This is the newest tire in the test and among the most affordable. It's an amazing value, falling but six points short of the winner. Even if you take cost out of the equation, it's still an amazing piece of winter equipment.

As with all the other tires here, it has thousands of sipes to act as biting edges on ice. All the tires feature circumferential grooves (with the exception of the Nokian) and large channels to pump water and slush from the contact patch.

Excellent acceleration control exiting corners is a large contributor to this tire's second-quickest lap time, and the Continental felt stronger than the second-place Michelin in this regard, but still inferior to our winner. The WinterContact also exhibited even and progressive limit behavior, breaking away and returning to grip predictably via steering and throttle manipulation.

However, we had to brake a little earlier on the quick part of the snowcross, which lowered overall driver confidence. This was particularly alarming because the Conti came out of the corners so well and therefore carried greater speed. A lowest-in-test snow-braking score confirms our subjective findings.

Falling short in just a single subjective measurement, this tire rises to the top tier of winter rubber with its accurate steering, near-best snow acceleration, and attractive price.



2. MICHELIN

X-Ice XI3

SERVICE DESCRIPTION: **94H**
LOAD: **Extra**
TREAD DEPTH, IN: **10.5/32**
PRICE PER TIRE: **$152**



Tire development is an agonizingly slow process. A Michelin engineer told us recently that, after exiting Formula 1 racing in 2006, the company is just now trickling that technology down into its workaday road tires. We've put many sets of XI2s, the XI3's predecessor, on cars in our 40,000-mile long-term fleet, and the difference in feel between the two generations is remarkable.

Subjectively speaking, the XI3 finishes second only to the Nokian. A slight reduction in control versus the Hakkapeliitta in sharper corners indicates that the XI3's square edges, which all the winter tires in our test have, don't work quite as well as the Nokian's. Laps feel quick but also quite a bit looser, requiring a lot more driver effort to keep the car under control. Also, on-throttle understeer—most apparent when attempting to power out of a corner—is ever so slightly more pronounced here than with the Nokians. Despite these minor complaints, noticeable mostly in this controlled comparison setting, the XI3 remains a very well-balanced tire on snow and ice.

The XI3 scored evenly with the Nokian in three objective tests: snow acceleration, snow braking, and ice braking, while taking a one-point hit on ice acceleration. In terms of objective results, the first- and second-place tires are essentially the same.



1. NOKIAN

Hakkapeliitta R2

SERVICE DESCRIPTION: **94R**
LOAD: **Extra**
TREAD DEPTH, IN: **11/32**
PRICE PER TIRE: **$200**



This tire is a bit of a dark horse. Finland's Nokian, the 19th-largest tire manufacturer in the world, is probably unknown to many readers. Bridgestone is No. 1. Dunlop, Continental, and Yokohama are household names, and Michelin is a performance-tire behemoth. While it makes summer tires, Nokian specializes in winter-tire manufacturing, and it shows.

All the development, ongoing since Nokian introduced the first dedicated winter tire 81 years ago, translates into a tire that outperformed or tied its competitors in every test, objective or subjective. In some cases, the margin of victory was narrow, as in ice acceleration, where it bettered the XI3 by a mere 0.17 second. But a win is a win.

The most eye-opening trait of this Hakkapeliitta R2 is the way it steers on the snow and recovers from understeer. As steering angle increases, the R2 continues to turn the car where the other tires give up. Get into the push, dial it back a few degrees, and the grip returns. It feels more like a summer tire in the wet than a winter tire in the snow. And saying Hakkapeliitta out loud is nearly as enjoyable as driving them.

The one category this tire didn't win is price. In this size, the R2 costs $48 more per tire than the second-place Michelin. That's a bitter pill when you are talking about something most drivers consider a wintertime luxury. But we don't. If the best winter traction is what you want, and you can afford the premium, look no further.



The name Hakkapeliitta dates to a 15th-century Finnish battle cry and roughly translates to "Hit them hard."

★ TEST RESULTS

	SNOWCROSS LAP TIME, SEC	SNOW ACCELERATION, 3–18 MPH, SEC	SNOW BRAKING, 18–3 MPH, FT	ICE ACCELERATION, 3–16 MPH, SEC	ICE BRAKING, 16–3 MPH, FT
Bridgestone	30.15	3.48	**33.3**	7.34	37.8
Continental	29.52	3.46	34.5	7.28	38.2
Dunlop	29.74	3.55	33.8	8.31	39.1
Michelin	29.73	3.41	33.5	7.19	36.3
Nokian	**29.43**	**3.40**	**33.3**	**7.02**	**36.0**
Yokohama	31.17	3.53	34.7	8.00	38.9

★ FINAL RESULTS

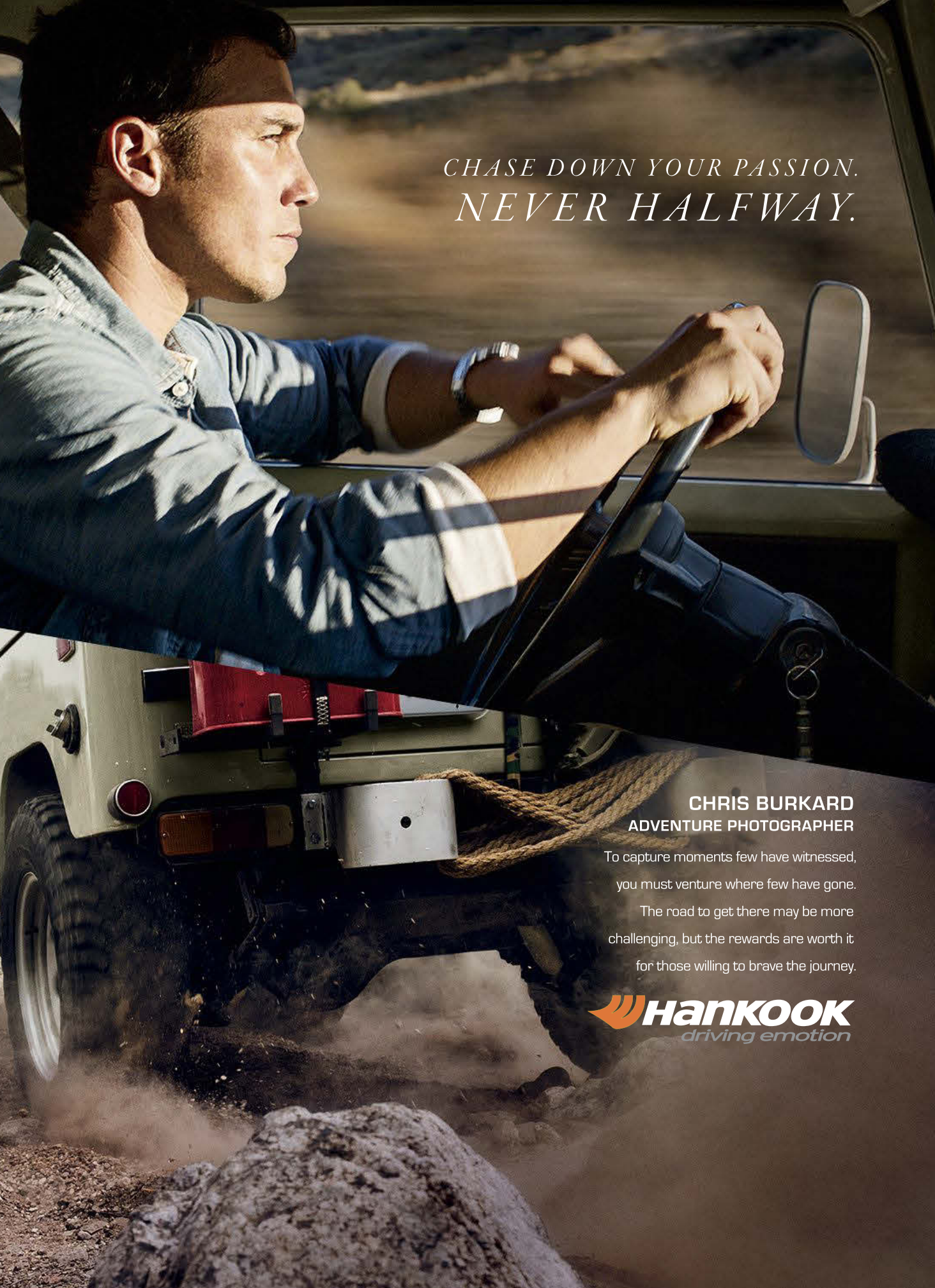
	SNOWCROSS LAP TIME	SNOW ACCELERATION	SNOW BRAKING	ICE ACCELERATION	ICE BRAKING	PRICE	SUBJECTIVE RATING	GRAND TOTAL
Maximum Points Available	*40*	*20*	*20*	*20*	*20*	*10*	*20*	*150*
1. Nokian	**40**	**20**	**20**	**20**	**20**	4	**20**	**144**
2. Michelin	38	**20**	**20**	19	**20**	8	18	143
3. Continental	39	19	18	18	17	**10**	17	138
4. Bridgestone	36	18	**20**	18	17	7	14	130
5. Dunlop	38	17	19	12	16	9	16	127
6. Yokohama	30	17	18	14	16	**10**	14	119

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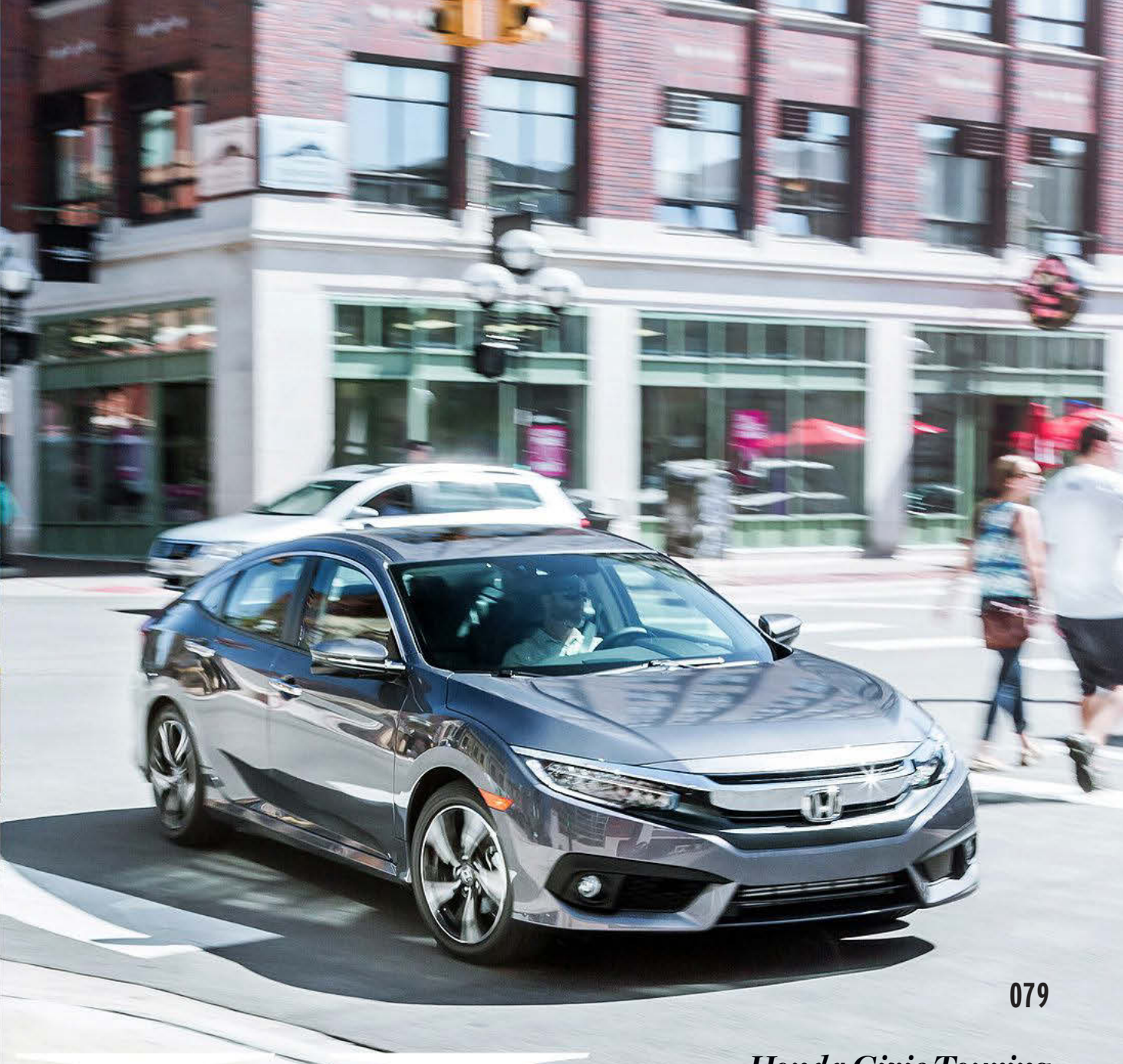


STREET SCENE, TAKE FOUR

WITH ITS FOURTH CIVIC UPDATE IN FIVE YEARS, HONDA FINALLY GETS IT RIGHT.

by Jeff Sabatini

photography by Marc Urbano

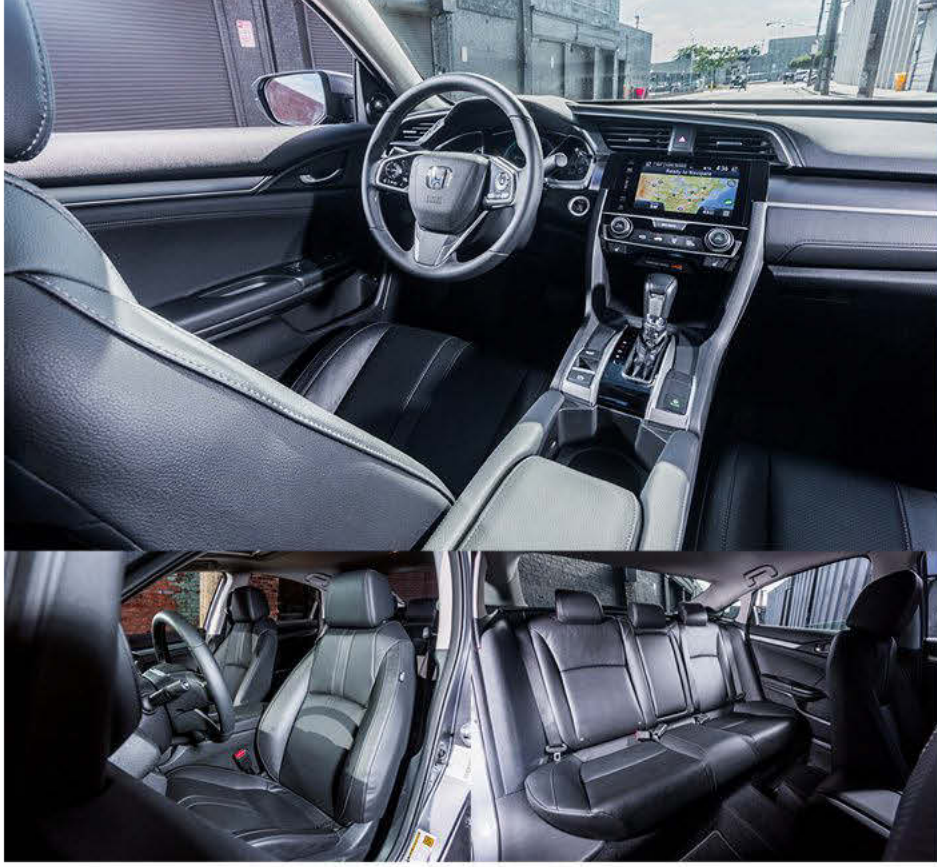


079

Honda Civic Touring

Honda will undoubtedly look back on the ninth-generation Civic, that unlovable lump of cheapness, as a lesson in continuous improvement. In so repeatedly flexing its renowned rapid-product-development muscle—overhauling the all-new 2012 Civic just a year later and then adding substantial equipment including a new transmission for 2014—Honda has surely grown stronger. It certainly righted the ship from a business standpoint. Civic sales boomed over the past three years, even if enthusiasts, ourselves included, haven't much praised the product of Honda's face-saving efforts. Yet this is not the sort of company to content itself with popularity. Honda has traditionally sought critical acclaim as well, with cars that are more like Spielberg films than blockbusters from Michael Bay.

Fade in, then, on the 10th-generation Civic.



Resembling nothing so much as a shrunken Accord Crosstour, this sedan only appears to be a hatchback. (Additional body styles, including a coupe and a four-door hatchback, also will be available.) And the new Civic rides on a platform that will be shared with the next Accord.

As with other recent Hondas, the top-of-the-line Civic is now called Touring. It's an apt moniker for a car that plants all four tires on the practical side of a compact-segment continuum that ranges from the appliancelike Toyota Corolla to the apex-predator Volkswagen GTI. But this is also to say that the new Civic is well planted. Among its remedies to the outgoing model are the abilities to go and turn quite well.

A new 1.5-liter four-cylinder available in the pricier trims makes 174 horsepower at 6000 rpm. Fitted with a single-scroll turbocharger pumping up to 16.5 psi of boost, its 162 pound-feet of torque makes it a small-displacement Honda engine with heretofore unheard of grunt from a stoplight. The power is felt but not heard, the engine's voice corked by the turbocharger and the new car's extensive sound isolation. Lesser Civics get a naturally aspirated 2.0-liter with only 158 horsepower, which still shames last year's 143-hp 1.8-liter four. The 1.5-liter engine, the first turbo the Honda brand has offered here in a car, is good enough to speed the 2924-pound 2016 Civic from zero to 60 mph in 6.8 seconds, cutting two seconds off the old car's run.

Spoiler alert: The Civic performs this feat with a continuously variable transmission tucked between its crankshaft and constant-velocity joints. At least the CVT mostly behaves itself, with the turbo four's 1700-to-5500-rpm torque plateau keeping it from chasing the ends of the tachometer with your right foot's every twitch. There is some turbo lag from a standing start, but once revs build, throttle response is better than with most CVTs. Put the transmission in S rather than D and the engine is kept spinning about 1000 rpm higher so that the turbo spools up more quickly. The CVT even does a reasonable imitation of a conventional automatic when the driver mashes the throttle pedal to the floor, "upshifting" at its 6000-rpm power peak. But just as in last year's CVT-equipped Civic, there is no manual mode to control the ratio slide. At this point, no manual transmission is offered with the turbocharged engine, either, though Honda will sell you a six-speed with the 2.0-liter.

The Civic's structure is solid and stiff, and the ride quality is excellent. Thick anti-roll bars (1.0 inch in front and 0.7 inch in the rear) help the front struts and rear multilink suspension keep body movements in check. The wallowing understeer common in this class has been uncommonly banished; brake-based torque vectoring crisply points the car into turns in a way the old Civic could never manage. The new variable-ratio electrically assisted power steering is about 10 percent quicker than before, though it's still too flavorless. Turn the wheel past its annoying on-center dead spot and it does weight up, but without telling you much about what the front tires are doing.

They were mostly squealing during testing. The Civic's 0.82-g performance on our skidpad trailed the last Civic sedan we tested in 2014. Braking was also off the pace, the car taking 178 feet to stop from 70 mph, 13 feet more than the old model. We blame the Civic's all-season Firestones, sized at 215/50R-17, for letting down the improved chassis. With slightly more sidewall than the old model's 45-series tires, it's a sure bet that this rubber was selected for reasons besides its ability to grip the road, such as ride comfort and low rolling resistance.

The Civic grows 2.9 inches longer, and Honda stretched the wheelbase 1.2 inches, to 106.3. The car is also wider and lower, and combined with an inch drop to its seating position, it feels both more substantial than before and more driver-oriented from behind the wheel. The seats are nearly perfect, and the shifter—useless as it may be in this application—sits at just the right height and distance from the driver's torso.

Honda replaced its much-maligned two-tiered instrument panel with a single binnacle containing a bright and cleanly arranged display. The interior materials are far richer-feeling than in the ninth-generation's cabin, with a layered dash design that makes the plastics seem unexpectedly sophisticated. Inside and out, the car gives the impression of being bigger than the specs would indicate. But despite the cabin's airiness and the exterior's big overnight-mailer envelope, interior space is only slightly larger than before while the trunk

↑ Compared with its generously creased, quasi-hatchback exterior styling, the Civic's interior looks positively pedestrian.





grows two to three cubic feet, depending on equipment. In terms of useful volume, though, the Civic now lives on the larger side of the compact class.

Appreciation of the Civic's busy exterior styling comes only after stepping away from the car and allowing its many character lines to recede from prominence. Only then does it become possible to notice how the Civic's deeply drawn metal has a way of bending daylight around the body, making the design seem fluid and well integrated. Some distance also made it harder for us to see the questionable panel gaps of our preproduction car. But by the time we returned the Civic to Honda, a plurality of editors were giving the new look two nonironically enthusiastic thumbs up.

The Touring-level interior is as packed with equipment as its shiny exterior skin is festooned with creases. A seven-inch infotainment screen sits flush in the center of the dash above a console that seems inspired by the bilevel unit in Honda's minivan surrogate, the Pilot.

On the left spoke of the Civic's steering wheel, we discovered the most useful touch-capacitive control we've ever encountered in a vehicle: a ribbed plastic volume lever that allows fine adjustment by pressing on its ends, as well as larger decibel changes by sliding a thumb across its length. On the opposite spoke, there's a cluster of buttons for operating the included adaptive cruise control and lane-keeping system.

We hope Google has a better handle on self-driving than Honda, whose lane-keeping assist starts tugging the wheel to the left immediately after it's turned on—provided the system can spot the lane markings, which it usually couldn't. That's not a bad thing, as it saves the driver from the terror of having the car ride so close to the center stripe that there's the peril of losing a side mirror or inadvertently testing the car's frontal offset-collision performance. Each attempt at using the system at different speeds and on different roads fared similarly, leading us to believe that it was either malfunctioning or poorly calibrated. The adaptive cruise control worked better, although its low-speed performance was so noisy and herky-jerky that it was easier to control speed ourselves.

Ultimately, to us, it's the driving that matters most, and this is where the new Civic acquits itself best. But as Honda has continued to throw everything but the kitchen sink at the Civic in the cause of continuous improvement, it also flirts with overwhelming the Civic with too much styling, too much equipment, too much concern for efficiency, and too many models. This is still just a compact car, after all. Honda has delivered a satisfying rough cut with the new sedan, but it's the director's cut we're keen to see, a car with more focus. We are eagerly awaiting the Si and Type-R performance versions, coming soon.

HONDA CIVIC TOURING

+ Well-dressed interior; potent, turbocharged power; a willing chassis.
− More creases than a rack of trousers, uncooperative technology, a good CVT is still a CVT.
= A Civic we can applaud, even if it's not the Civic we want to see.





HONDA CIVIC TOURING

SPECIFICATIONS

PRICE
AS TESTED ..... $26,500 *(est)*
BASE ..... $26,500 *(est)*

VEHICLE TYPE: front-engine, front-wheel-drive, 5-passenger, 4-door sedan
OPTIONS: none
STANDARD: power windows, seats, locks, and sunroof; remote locking and starting; cruise control; tilting and telescoping steering wheel
AUDIO SYSTEM: satellite radio; minijack, 2 USB, and Bluetooth-audio inputs; 8 speakers

ENGINE
turbocharged and intercooled inline-4, aluminum block and head

BORE X STROKE ... 2.87 x 3.52 in, 73.0 x 89.4 mm
DISPLACEMENT ..... 91 cu in, 1497 cc
COMPRESSION RATIO 10.6:1
FUEL DELIVERY SYSTEM ..... direct injection
TURBOCHARGER ..... MHI TD03
MAXIMUM BOOST PRESSURE ..... 16.5 psi
VALVE GEAR: double overhead cams, 4 valves per cylinder, variable intake- and exhaust-valve timing
REDLINE/FUEL CUTOFF ..... 6500/6100 rpm
POWER ..... 174 hp @ 6000 rpm
TORQUE ..... 162 lb-ft @ 1700 rpm

DRIVETRAIN
TRANSMISSION: continuously variable automatic
FINAL-DRIVE RATIO 4.81:1

	RATIO	MPH PER 1000 RPM	MAX SPEED
LOWEST	2.65:1	5.8	35 mph
HIGHEST	0.41:1	37.7	126 mph

CHASSIS
unit construction
BODY MATERIAL: steel stampings

EXTERIOR DIMENSIONS
WHEELBASE ..... 106.3 in
LENGTH ..... 182.3 in
WIDTH ..... 70.8 in
HEIGHT ..... 55.7 in
FRONT TRACK ..... 60.9 in
REAR TRACK ..... 61.5 in
GROUND CLEARANCE ..... 5.4 in

INTERIOR DIMENSIONS
SAE VOLUME ..... **F:** 52 cu ft **R:** 43 cu ft
TRUNK ..... 15 cu ft

STEERING
rack-and-pinion with variable ratio and variable electric power assist
RATIO 13.2–10.9:1
TURNS LOCK-TO-LOCK 2.2
TURNING CIRCLE CURB-TO-CURB ..... 35.7 ft

SUSPENSION
F: ind, strut located by a control arm, coil springs, anti-roll bar
R: ind, 1 trailing arm and 3 lateral links per side, coil springs, anti-roll bar

BRAKES
F: 11.1 x 0.9-in vented disc
R: 10.2 x 0.4-in disc
STABILITY CONTROL ..... partially defeatable

WHEELS AND TIRES
WHEEL SIZE/CONSTRUCTION ..... 7.0 x 17 in/cast aluminum
TIRES ..... Firestone FT140 215/50R-17 91H M+S

★ NOTABLE HIGHLIGHTS

While Honda is no stranger to turbocharging, this brand has been slow to join the booster club. Other applications will closely follow this mainstream Civic turbo.

CAR AND DRIVER *TEST RESULTS*

ACCELERATION

ZERO TO	SECONDS
30 MPH	2.7
40 MPH	3.9
50 MPH	5.2
60 MPH	**6.8**
70 MPH	8.8
80 MPH	11.1
90 MPH	13.9
100 MPH	**17.7**
110 MPH	22.4
120 MPH	28.6
ROLLING START, 5–60 MPH	7.5
TOP GEAR, 30–50 MPH	3.9
TOP GEAR, 50–70 MPH	4.9
1/4-MILE	**15.3 sec @ 94 mph**
TOP SPEED *(GOV LIMITED)*	126 mph

TEST NOTES: *Select the S transmission shift position, gas it, and go. Wheelspin is not an issue. The CVT simulates a step automatic by cycling between 5000 and 6000 rpm.*

HANDLING

ROADHOLDING, 300-FT-DIA SKIDPAD ..... **0.82 g***
UNDERSTEER ..... MODERATE

TEST NOTES: *The combination of all-season tires and a stability-control system that cannot be fully disabled yields a modest 0.82-g cornering limit.*

BRAKING, 70-TO-ZERO MPH

FIRST STOP ..... 179 ft
SHORTEST STOP ..... **178 ft**
LONGEST STOP ..... 182 ft
FADE RATING ..... NONE

TEST NOTES: *Braking performance is unremarkable. Stopping distances are typical of the affordable-compact class, and we observed no fade.*

WEIGHT

CURB ..... 2924 lb
PER HORSEPOWER ..... 16.8 lb
DISTRIBUTION ..... **F:** 60.9% **R:** 39.1%
CENTER-OF-GRAVITY HEIGHT ..... 21.0 in
TOWING CAPACITY ..... 0 lb

FUEL

CAPACITY ..... 12.4 gal
OCTANE ..... 87 required
EPA CITY/HWY ..... 32/42 mpg (*C/D* est)
***C/D* OBSERVED** ..... **28 mpg**

INTERIOR SOUND LEVEL

IDLE ..... 38 dBA
FULL THROTTLE ..... 78 dBA
70-MPH CRUISING ..... 71 dBA

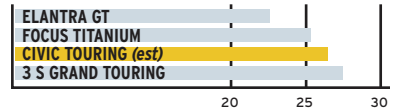
tested by ERIC TINGWALL *in Chelsea, Michigan*



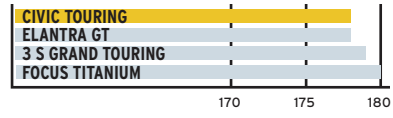
COMPETITORS

FORD FOCUS TITANIUM *(2.0-L I-4, 160 HP, 5-SP MAN)*
HONDA CIVIC TOURING *(1.5-L I-4, 174 HP, CVT)*
HYUNDAI ELANTRA GT *(2.0-L I-4, 173 HP, 6-SP AUTO)*
MAZDA 3 S GRAND TOURING *(2.5-L I-4, 184 HP, 6-SP AUTO)*

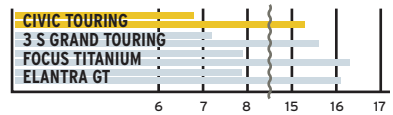
CURRENT BASE PRICE *dollars x 1000*
Includes freight and performance options.



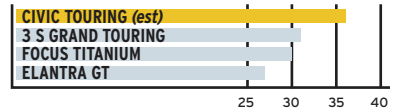
70-0 BRAKING *feet*



ACCELERATION *0–60 & 1/4-mile, seconds*



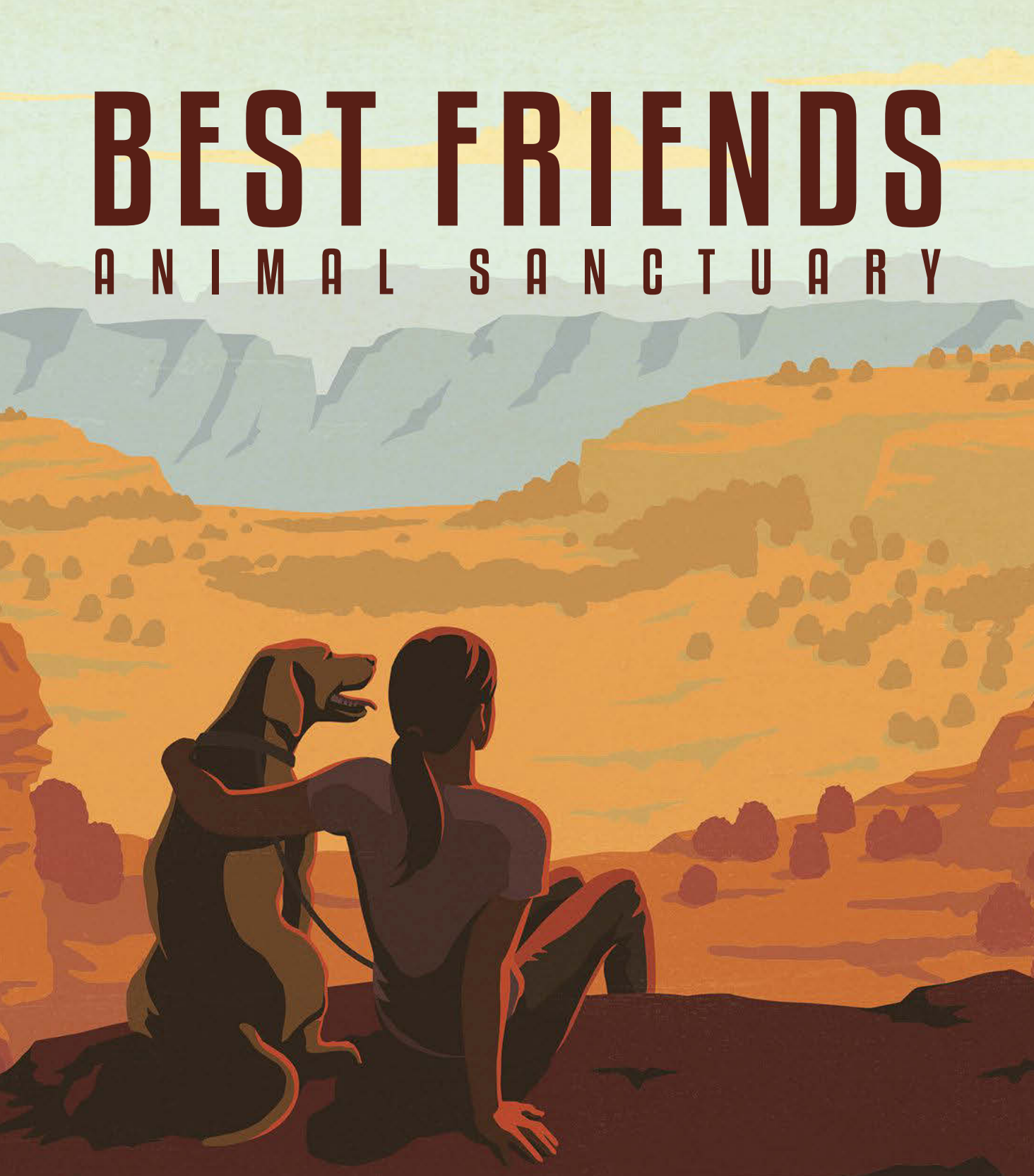
FUEL ECONOMY *EPA combined mpg*



Shell V-Power NiTRO+ Premium Gasoline
The Official Fuel of CAR AND DRIVER

*Stability-control inhibited.

BEST FRIENDS
ANIMAL SANCTUARY

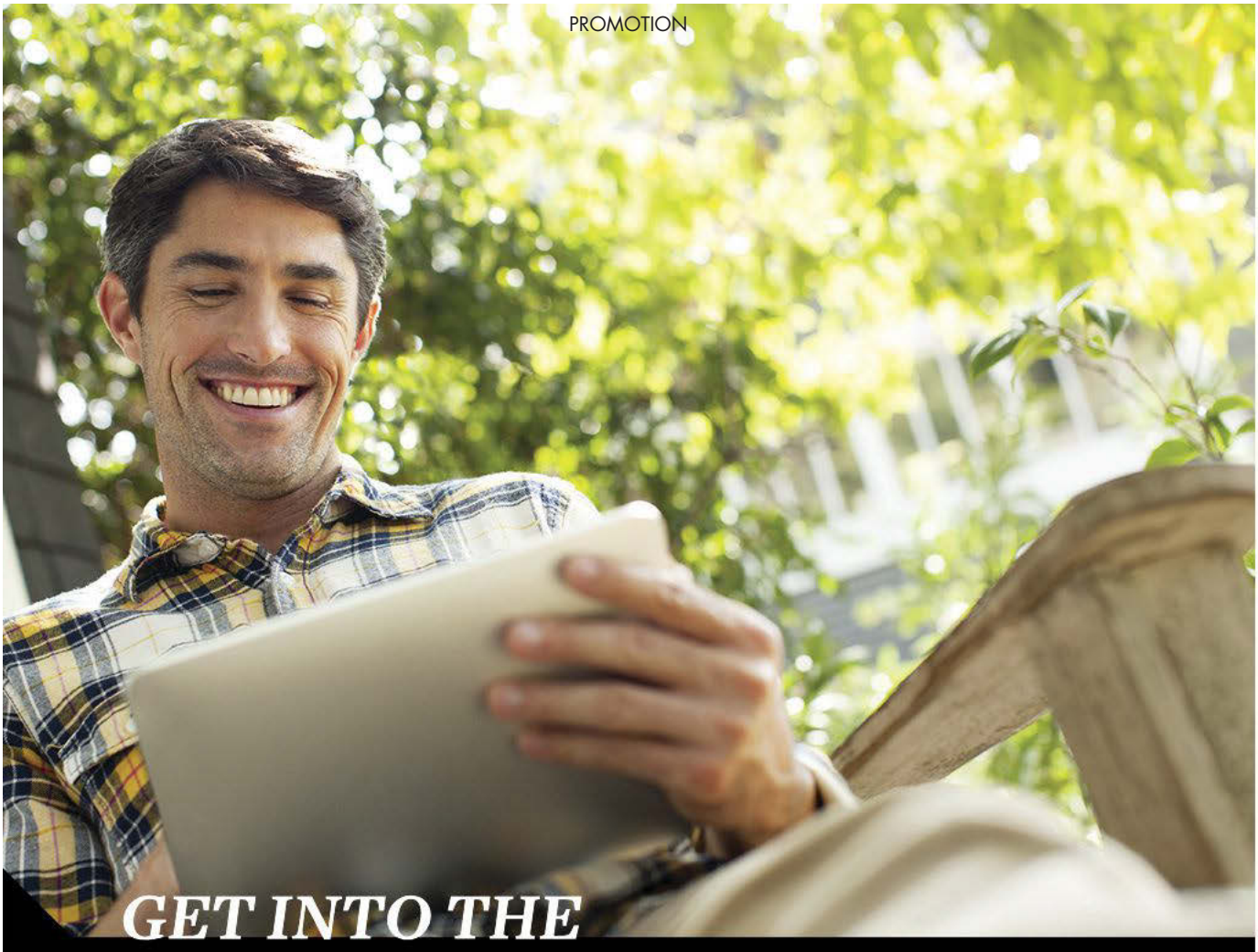


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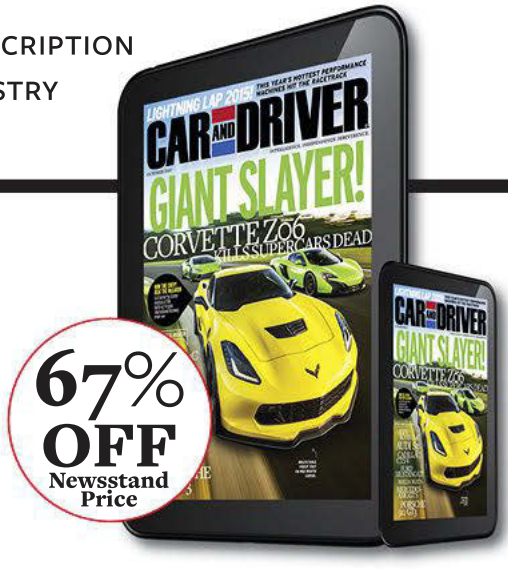
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LONG-TERM TEST



HALF & HALF

The last part of our 40,000 miles with the Corvette was great. The first part? Not so much.

Let's get this out of the way up front: The litany of breakdowns suffered by our long-term 2014 Chevrolet Corvette Stingray Z51 (C7) was simply appalling. Yes, we know a car is a machine made up of thousands of components, and that despite massive leaps in technology and manufacturing that make cars far more reliable today than they were just a couple of product cycles ago, things can and do go wrong. But sheesh.

by **MIKE SUTTON**

this page: photography by **MARC URBANO**

Things were fine at first, starting with our coupe's base price of $51,995, which is nearly 30 grand less than the base price of another popular way to go fast, the Porsche 911. Among the C7's standard features are its rigid aluminum space frame and lightweight Batman bodywork that always grabs attention, even in our test car's reserved Blade Silver Metallic. Contrasting black wheels ($495) and "carbon flash" exterior accents ($100) surely helped. The suspension still uses composite (fiberglass) transverse leaf springs, but the Stingray is altogether more high-tech and engaging to operate than before.

The C7's interior is vastly improved from the C6's. Nicely equipped to start, our test car also included the mid-level 2LT equipment group ($4210), which added heated and ventilated seats, a color head-up display, and other luxuries. We also opted for carbon-fiber interior trim ($995) and Chevy's MyLink navigation ($795). The "Car and Driver" identification plaque on the console ($200) flattered our already-inflated egos. As tested, including other options to be cited shortly, the car's price was $66,575. Little did we know how special it really was.

Our Stingray's problems started innocently enough when—at 850 miles—the eight-inch center touch screen began malfunctioning because of contact with the surrounding trim panel. Adjusting the trim piece was a simple warranty fix, but other problems followed.

GM's new aluminum-block, 6.2-liter LT1 V-8 is the heart of the C7, and most of the time it thundered to life and roared like a NASCAR stocker as we worked the standard seven-speed manual transaxle. Our optional variable performance exhaust ($1195) gave it a motorboat yowl. Rated at 460 horsepower and 465 pound-feet of torque, the big LT1 smoothly chugged away from idle and yanked itself up to its 6600-rpm redline.

The latest small-block is clever, too, with direct fuel injection, variable valve timing, and cylinder deactivation. Assisted by the Stingray's slick profile and tall gearing, we averaged 21 mpg overall and regularly traveled more than 30 highway miles on a gallon of premium, making the Corvette an adept road-trip companion. It was comfortably long-legged on ventures to New Jersey, North Carolina, Virginia, and Wisconsin. After its recommended break-in period, our 3436-pound test car was properly quick, reaching 60 mph in 3.9 seconds and covering the quarter in 12.2 seconds at 118 mph.

But the dry-sump oiling system included with the $2800 Z51 package could not prevent the engine from self-destructing. It grenaded at 6000 miles, when we rolled onto a local chassis dynamometer to measure the LT1's power at the pavement. The engine started to eat itself before we could begin the testing in earnest. Fearing the V-8 was in the early stages of seizure, we shut it down and ordered a flatbed for transport to our dealership.

It took the dealer two weeks to replace the engine under warranty, and GM engineers provided a full tear-down and analysis of the mishap. A connecting-rod bearing had failed, sending debris through the LT1's belly and chewing up more internals. In related news, GM acknowledged that the engine manufacturing plant had experi-

↓ Below left: During its 17 months in our care, the Stingray was powered by 16 cylinders. Unfortunately, not all at the same time.





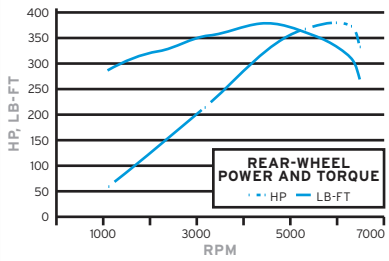




2014 CHEVROLET CORVETTE STINGRAY

SPECIFICATIONS

VEHICLE TYPE: front-engine, rear-wheel-drive, 2-passenger, 2-door targa
PRICE AS TESTED $66,575
BASE PRICE $51,995
ENGINE TYPE: pushrod 16-valve V-8, aluminum block and heads, direct fuel injection
DISPLACEMENT ..... 376 cu in, 6162 cc
POWER ..... 460 hp @ 6000 rpm
TORQUE ..... 465 lb-ft @ 4600 rpm
TRANSMISSION ..... 7-speed manual



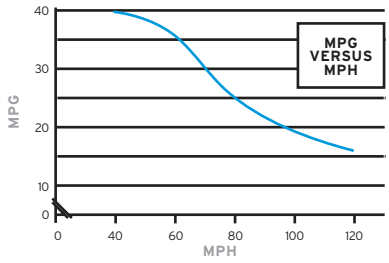
WHEELBASE ..... 106.7 in
LENGTH ..... 176.9 in
WIDTH ..... 73.9 in
HEIGHT ..... 48.6 in
CENTER-OF-GRAVITY HEIGHT ..... 17.5 in
PASSENGER VOLUME ..... 52 cu ft
CARGO VOLUME ..... 15 cu ft
CURB WEIGHT ..... 3436 lb

WARRANTY

3 years/36,000 miles bumper to bumper
5 years/100,000 miles powertrain
3 years/36,000 miles corrosion protection
6 years/100,000 miles rust-through protection
5 years/100,000 miles roadside assistance

MODEL-YEAR CHANGES

2015: OnStar upgraded with 4G LTE and Wi-Fi hotspot; automatic transmission upgraded to eight-speed; Performance Data Recorder option; new carbon-fiber ground-effects package; ZF1 option with Z51 wheels and spoiler only; performance exhaust included with Z51 Performance package.
2016: Minor interior- and exterior-trim changes, new flat-bottomed steering wheel, optional front curb-view parking camera, magnetic-ride-control dampers available without Z51 package, Chevrolet MyLink upgraded to include Apple CarPlay.



PHOTOGRAPHY BY MICHAEL SIMARI; ILLUSTRATIONS BY PETE SUCHESKI

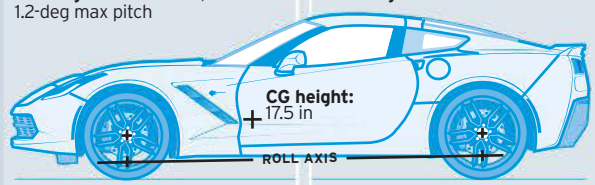


C/D TEST RESULTS

PERFORMANCE	NEW	40,000
ZERO TO 60 MPH	**3.9 sec**	**3.9 sec**
ZERO TO 100 MPH	8.6 sec	8.8 sec
ZERO TO 130 MPH	14.7 sec	15.0 sec
ROLLING START, 5-60 MPH	4.4 sec	4.4 sec
1/4-MILE	**12.2 sec @ 118 mph**	**12.3 sec @ 118 mph**
BRAKING, 70-0 MPH	137 ft	137 ft
ROADHOLDING, 300-FT-DIA SKIDPAD	1.03 g	1.07 g
TOP SPEED *(DRAG LIMITED)*		181 mph
EPA FUEL ECONOMY, CITY/HWY		17/29 mpg
C/D-OBSERVED FUEL ECONOMY		**21 mpg**
UNSCHEDULED OIL ADDITIONS		2 qt
A2 WIND TUNNEL MEASUREMENTS		
DRAG COEFFICIENT		0.37
FRONTAL AREA		21.1 sq ft
DRAG AREA *(Cd x FRONTAL AREA)*		**7.9 sq ft**
DRAG FORCE @ 70 MPH		99 lb
AERO POWER @ 70 MPH		19 hp
AERO POWER @ 100 MPH		54 hp
FRONT-AXLE LIFT @ 100 MPH		36 lb
REAR-AXLE LIFT @ 100 MPH		-51 lb
OPERATING COSTS *(FOR 40,000 MILES)*		
SERVICE *(5 SCHEDULED, 7 UNSCHEDULED)*		$661
NORMAL WEAR		$1708
GASOLINE *(@ $3.38 PER GALLON)*		$6438
NONWARRANTY REPAIRS		
SHIFT-LINKAGE ADJUSTMENT		$252
DAMAGE AND DESTRUCTION		
WINDSHIELD REPLACEMENT		$937
LIFE EXPECTANCIES *(ESTIMATED FROM 40,000-MILE TEST)*		
TIRES		25,000 miles
FRONT BRAKE PADS		100,000 miles
REAR BRAKE PADS		more than 100,000 miles
WHAT BITS AND PIECES COST		
HEADLAMP		$1250
ENGINE AIR FILTER		$100
OIL FILTER		$6
WHEEL *(FRONT/REAR)*		$885/$935
TIRE *(FRONT/REAR)*		$357/$427
WIPER BLADES *(LEFT/RIGHT)*		$12/$12
FRONT BRAKE PADS		$234

Braking: 53% anti-dive, 1.2-deg max pitch

Acceleration: 49% anti-squat
Braking: 90% anti-lift



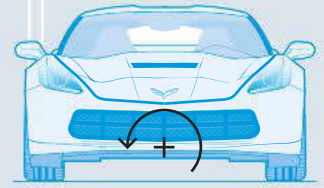
Roll-center height: 2.7 in
Suspension stiffness: 111 lb/in
Load: 1700 lb (49.5%)

Roll-center height: 4.5 in
Suspension stiffness: 160 lb/in
Load: 1736 lb (50.5%)



Steering ratio:
16.8:1 on-center
15.9:1 +/- 90 deg, average

Roll-stiffness distribution:
front 42%, rear 58%
Roll: 1.9 deg/g
Max roll angle: 2.0 deg



GLOSSARY

- **ANTI-DIVE, -LIFT, -SQUAT:** Terms that describe how suspension geometry is configured to counter body movement during acceleration and braking.
- **SUSPENSION STIFFNESS:** The force from acceleration, braking, cornering, or bumps required to deflect each wheel one inch.
- **ROLL CENTER:** A hypothetical point around which the body rolls in corners.
- **ROLL AXIS:** A line connecting front- and rear-suspension roll centers.
- **STEERING RATIO:** Degrees of steering-wheel movement required to change the front wheels' angle one degree.
- **ROLL STIFFNESS:** A car body's resistance to roll in corners; suspension springs, anti-roll bars, and tire sidewalls all contribute to this metric. How this resistance is distributed between the front and rear axles is a major understeer determinant.

K&C data by Morse Measurements, Salisbury, North Carolina.
Road-horsepower data by The Car Guys, Brighton, Michigan.

RANTS AND RAVES

JENNIFER HARRINGTON
This car is such a sweetheart, and its fuel economy still amazes me. And removing the top and putting it back on is an easy, one-person job.

RON SESSIONS
There's still some work to do on the shifter, which has all the finesse of a Lincoln Log in a burlap sack.

CAROLYN PAVIA-RAUCHMAN
I feel as if I could drive this car for hours and hours.

AARON ROBINSON
This car needs seven speeds like it needs square wheels.

ALEXANDER STOKLOSA
I love the way the whole car subtly rocks to the small-block's lumpy idle. On the flip side, driving this car makes me feel like a 50-something divorcé.

JEFF SABATINI
Count me as one who thinks that the replacement engine has not married to the clutch and transmission as seamlessly as the original.

DON SHERMAN
My vote for America's best car. A highly engaging commuter. This is a ride I'd actually stoop to buying.

JARED GALL
I absolutely love this car, but I would never recommend anyone buy one. The only safe course of action is to convince GM to loan you one until it breaks.

ERIK JOHNSON
It still amazes me how easy this thing is to live with in day-to-day traffic.

JULI BURKE
Exhilarating having all the passing power I needed, but I grew weary of the noisy, rough ride.

enced some difficulty ridding the inside of the block of machining burrs. As luck would have it, its oil-filter manufacturer had a similar problem; some filters had a thread shard that could come loose and contaminate the lubrication system. The only good part of this story is that our engine was replaced at no charge.

Acceleration figures were about the same with the second engine when we returned to the track at the end of the test. Yet, technical editor K.C. Colwell noted that the car would've likely been quicker than new if the shifter wasn't "tighter than any other C7 I've driven." Other drivers agreed, chiding the seven-speed for its chunky engagement, propensity to pop out of lower gears, and the difficulty in navigating the tightly spaced gates. At 38,000 miles, we had the dealer adjust the shifter's linkage in accordance with a service bulletin, but that made little difference.

The Stingray's bad luck piled on with the miles. Fixing a windshield stone chip wasn't a big deal at $50, but the glass subsequently cracked, costing us $937 for a replacement. We also had to shell out $854 for new rear Michelins at 13,000 miles because of a puncture, and wearing out the fronts in 31,000 miles drained the coffers of another $714.

The C7's seats are a huge improvement over the C6's, which provided little lateral support and rocked back unsettlingly. But our car's $1995 Competition Sport thrones left us of two minds. While some drivers found them supremely comfortable for long treks, others called them overkill and found the short bottom cushion unsupportive. Their elevated hip points also gave the awkward feeling of sitting on a phone book and adversely affected the driving position. And then the passenger's seat-mounted side airbag needed to be swapped out at 15,000 miles because of a defect prompting a recall. The car was returned to us with an unraveling driver's seatback cover, which would ultimately need to be replaced, too.

Although we had fitted excellent Michelin Pilot Alpin PA4 winter tires, the Corvette struggled in the deep freeze of our Michigan winter. In sub-zero temps, the LT1 V-8 could take up to 12 seconds of cranking before firing, which surely contributed to the starter motor dying at 21,000 miles. Shortly thereafter, the brain of the Stingray's heating-and-air-conditioning system began shutting down intermittently—in mid-January—and needed to be swapped. We donned parkas and limped the car along while the dealer ordered a new control unit, but this issue still took nearly three weeks to resolve.

The C7's axle seals began leaking lubricant at 25,000 miles. Frigid winter weather probably aggravated this failure. GM was in the process of installing more-durable seals in production, and the improved parts supplied to our dealer cured the issue. But it's worth mentioning that neither our long-term 2014 Jaguar F-type V-8 S nor our 2014 Porsche Cayman S, which both suffered through the same awful winter, had any problems dealing with the cold.

Throughout the frigid months, the Corvette was the car to avoid. The heated seats only got lukewarm, and the already-finicky shifter felt like it was stirring a bag of cement until the drivetrain warmed up. We also were tiring of the cacophony of road

↓ We still appreciate the C7 Stingray's brilliant-cut faceted styling, and we don't miss round taillights one little bit, actually.









PHOTOGRAPHY BY MICHAEL SIMARI

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and tire noise that suffused the cabin, exacerbated by winter tires. The C7's aggressive steering geometry also meant that the front tires would annoyingly scrub in tight parking maneuvers, a tradeoff for the car's impressive handling.

The Stingray's final 15,000 miles were mostly trouble-free once the weather warmed. Although several drivers noted that they would've probably traded in the Corvette by now were it their personal car, we went back to enjoying the rest of the Z51's performance hardware: sportier suspension settings, an electronic limited-slip differential, shorter transmission gearing, larger slotted brake rotors, transmission and differential coolers, and 19-inch front and 20-inch rear wheels with run-flat Michelin Pilot Super Sport tires (245/35s in front and 285/30s at the rear).

The optional Magnetic Ride Control dampers with GM's Performance Traction Management ($1795) further aided the chassis' balance and grip with little apparent harm to the C7's ride quality. Both systems are integrated into the console's Drive Mode Selector dial, which can tune the car's various systems from relaxed to race via five settings (snow/rain, eco, tour, sport, and track). The flexibility allowed the Stingray to be as poised in a fast sweeper as it was trundling down the highway. We all agreed the electric power steering had great feel and response, and the V-8's soundtrack never grew old.

Our initial trip to the test track yielded a stellar 137-foot stop from 70 mph, as well as 1.03 g's of stick on the skidpad. The Stingray's braking performance was the same at 40,000 miles as it was when new, yet there was less understeer, and lateral grip increased to a neck-straining 1.07 g's. Test-driver Colwell suspected a slight change in alignment as the cause, simply saying, "As it sits now, the car is hooked up."

Compared with the warranty work, the Corvette's scheduled maintenance every 7500 miles was straightforward. Our five visits cost $661 total, and included oil and filter changes, inspections, and replacing a few normal-wear items. The 30,000-mile service was the largest, at $255, but also included a clutch-fluid change. Although we had to pay for the first three oil and filter changes ($228) because our car was a GM test vehicle, actual owners would get those services for free under the Stingray's included oil changes for the first two years or 24,000 miles. To maintain a cordial relationship with our dealer, we resisted the urge to demand a refund.

We've experienced little if any trouble with the later Stingrays we've driven and want to think of our test car as a first-year anomaly. The latest Corvette is an amazing performance bargain, and it still pained us to hand back the keys. But the reality is that this Stingray failed spectacularly, and its 17-month evaluation was a test of our patience as much as it was of the car itself. We can forgive some of its troubles because the C7 is the type of machine we're happy to still have in our over-regulated and increasingly automated world. But we won't forget this experience anytime soon.

↓ Below: Somehow we managed to not pry off this badge before we returned the car.
Below middle: Targa-top stowage, done simply.







★ FLEET FILES



▲ 2015 VOLKSWAGEN GTI

17,919 MILES
30 OBSERVED MPG

So few are our gripes that we have sunk to new depths trying to criticize the GTI. "Feels like the flywheel is heavier than it needs to be," is as negative as the comments get. Positives include the descriptors "perfect," "amazing," "fantastic," and "perfect" (again). Apply those to chassis, powertrain, value, and comfort however you like; all adjectives suit all nouns. But there is a consensus that the radio interface feels a bit dated compared with the Mazda 3's. Through nearly half its tenure, the GTI has delivered 30 mpg with a flawless mechanical record. Flawless: another apt descriptor.



▲ 2014 PORSCHE CAYMAN S

33,096 MILES
23 OBSERVED MPG

We've been joyously piling miles onto our Guards Red Cayman S for a year now, and nothing has swayed us from our early impression that it might be the most satisfying car on the market. Not its lack of a USB port or navigation system (evidence of our attempt to keep the price in check). Not its bout of oil burning and lack of a dipstick (the burning has ceased). Not even the absurd cost of maintenance ($330 oil change, anyone?). After spending time in any number of less-inspired cars, a quick drive in the Cayman resets our auto-enthusiast compass to true north and nourishes our souls.

PHOTOGRAPHY BY MICHAEL SIMARI

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NOTE: Meets severe snow service requirements and branded with the mountain/snowflake symbol.



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TIRE RACK Consumer Recommended

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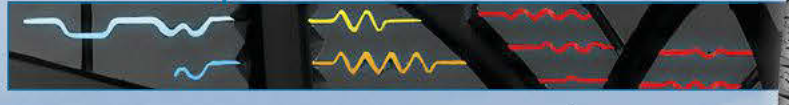


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Studdable Winter / Snow

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NEW
ALUTEC **Raptr**
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185/60R-14 Dunlop Winter Maxx
14x5.5 ALUTEC Grip



'15 Volkswagen Passat 1.8T SE
215/60R-16 Yokohama iceGUARD iG52c
16x7 MSW Type 22



'15 Toyota Tundra 4WD CrewMax
275/60R-18 Bridgestone Blizzak DM-V2
18x9 Ultra Motorsports Spline

WHICH PERFORMANCE CATEGORY IS RIGHT FOR YOU?

High-Tech Winter Traction



STUDLESS ICE & SNOW

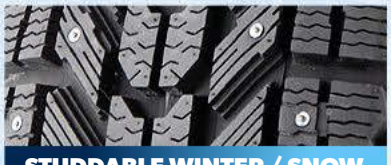
Developed to provide ice and snow traction similar to studded winter tires without using studs, these tires typically trade high-speed ratings and some handling responsiveness for enhanced snow and ice traction.



PERFORMANCE WINTER / SNOW

Developed as high-speed winter tires for European driving conditions, these tires typically trade some deep snow and ice traction for enhanced dry and wet road traction, handling and high-speed capability.

Traditional Winter Traction



STUDDABLE WINTER / SNOW

Developed to accommodate optional metal studs that enhance ice and hard-packed snow traction. When studded (studding available for $15 per tire), these tires typically trade some noise and ride comfort for extra ice and packed snow traction. When not studded they provide a low-cost winter tire option.

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245/60R-18 Goodyear Ultra Grip Ice WRT SUV
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. SEDAN

2017 AUDI A4

Embodies *Vorsprung durch Technik*. Disembodies the driving experience. *by Steve Siler*

[redacted] *Vorsprung durch Technik*, says Audi. Um, what? Yeah, Audi's indigenous marketing slogan makes zero sense to most Americans, but the fifth-generation A4 is the veritable embodiment of "Advancement through Technology." There's lots and lots of technology aboard; that's some serious *Authentizität in der Werbung* right there.

The truth in the advertising is that the 2017 A4 is an exceedingly cerebral automobile, blowing the academic curve in many respects both for the Audi brand and the entry-premium-sedan segment. Take, for example, the claimed 0.23 coefficient of drag, which not only is Audi's best ever but places it just shy of the staggering claim for the Mercedes-Benz CLA-class; it results from moving the mirrors to the doors, smoothing the underbody, and other tunnel-tested measures.

The A4 also brings Audi's Virtual Cockpit instrumentation as an option, plus inductive phone charging, 30-hue ambient lighting, and Apple CarPlay/Android Auto functionality. Its laundry list of driving aids includes Traffic Jam Assist (radar-based semi-autonomous driving up to 40 mph, including steering) and Exit Warning, which audibly and visually warns occupants exiting the car when an approaching motorist or bicyclist might strike the open door. This feature is more valuable in central Weisbaden than a Walmart lot, but Americans do still parallel park. Sometimes.

Progress has not been made in every respect, however. The styling is static at best, despite the subtle reconstitution of each body component to impart a longer, wider, and more diamond-cut look. The neo-clamshell hood, for example, features four elegant creases, and designers moved its shutlines outward to the A4's "tornado" line (Audi-speak for the car's shoulders), trickier to mass produce,

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per the company, but it's a cleaner look.

The headlamps are squintier and brighter than before thanks to standard bixenon or optional all-LED bulbs, while wider taillamps boast those nifty sequential turn-signal strips that Audi uses in Europe and that we feared might never make it to America. The grille is broader than it was previously, and the body appears more planted on account of a lower-body "light catcher"—a sort of shelf in the lower doors that reflects daylight and makes the car seem wider and lower. Overall, however, the new A4 appears merely refreshed, not redesigned, and is as stoic, elegant, and incessantly correct as always. Yawn.

This is a shame, since Audi improved so much elsewhere. Despite having grown 0.5 inch in wheelbase, an inch in length, and 0.6 inch in width, the upcoming A4 has dropped about 70 to 100 pounds in apples-to-apples U.S.-spec models, says Audi. (We'll verify soon, when we put the car on our scales.) The weight loss is due to widespread use of lighter materials in key areas, including brake components, suspension attachments, and body stampings. The cabin space grows in meaningful ways, too, such as rear legroom and front head- and shoulder room.

Partly because of a horizontally arranged dashboard dominated by a full-width band of vents and strakes, the cockpit feels spacious and can be made almost plush. Our car came with open-pore wood and caressable nappa leather that would be at home in the A8. We can also vouch for the stylishness of the A4's available patterned-aluminum trim, which stood in for the wood in other A4s at our drive event.

The MMI infotainment system now offers a fixed 8.3-inch stand-up screen, pinch-and-zoom functionality, and an octet of preset buttons, á la BMW's iDrive. More significant is the aforementioned Virtual Cockpit gauge cluster that we have begrudgingly come to admire. Here, as in the new Q7, as opposed to the new TT, it supplements, rather than replaces, the center screen to allow passengers to fiddle with the infotainment system.

A pair of 2.0-liter turbocharged and intercooled four-cylinders will be offered at launch: a TFSI gasoline engine pumping out 252 horsepower and 273 pound-feet of torque, and a 190-hp diesel with 295 pound-feet of torque. [The diesel output might change pending an update to VW's TDI engines in the wake of the emissions scandal; see page 023.] Both engines are mated to an all-new seven-speed dual-clutch automatic. Unconfirmed at this point, but very likely to appear within a

MATED TO A SEVEN-SPEED DUAL-CLUTCH AUTOMATIC, THE TURBOCHARGED 2.0-LITER GAS ENGINE DELIVERS EXCELLENT MIDRANGE OOMPH.



SPECIFICATIONS

VEHICLE TYPE: front-engine, front- or 4-wheel-drive, 5-passenger, 4-door sedan
BASE PRICE *(est)* $38,000
ENGINES: turbocharged and intercooled DOHC 16-valve 2.0-liter diesel inline-4, 190 hp, 295 lb-ft; turbocharged and intercooled DOHC 16-valve 2.0-liter inline-4, 252 hp, 273 lb-ft
TRANSMISSION: 7-speed dual-clutch automatic with manual shifting mode

DIMENSIONS

WHEELBASE ..... 111.0 in
LENGTH ..... 186.1 in
WIDTH ..... 72.5 in
HEIGHT ..... 56.2 in
CARGO VOLUME ..... 17 cu ft
CURB WEIGHT ..... 3500-3550 lb

PERFORMANCE (C/D EST)

ZERO TO 60 MPH ..... 5.4-6.9 sec
ZERO TO 100 MPH ..... 15.8-21.2 sec
1/4-MILE ..... 14.2-15.6 sec
TOP SPEED ..... 155 mph

FUEL ECONOMY (C/D EST)

EPA CITY/HWY ..... 22-32/31-44 mpg













year of this spring's on-sale date, is a Miller-cycle 2.0-liter four with 190 horsepower and fuel economy likely to surpass 40 mpg. A six-speed manual transmission could also appear.

The A4's launch took place around Venice, Italy, immediately following its Frankfurt auto-show debut. Audi only made available the TFSI Quattro with the DSG transmission. On the back roads between the Venice airport and the Dolomites, the TFSI engine exhibited impressive torque and a willingness to rev to its circa-6000-rpm power peak. Though it is certainly not as musical as, say, the N20 2.0-liter four-cylinder in the BMW 328i, turbo lag is minimal but not absent, and midrange throttle response is fabulous.

Here, the DSG's shifts feel more akin to a conventional automatic's than the VW GTI's rousing dual-clutch programming. We're told that the gearbox will be tuned further for America for a more assertive launch performance. Audi's zero-to-60 estimate of 5.6 seconds seems a bit conservative; the last A4 2.0T we tested clocked an identical zero-to-60 time, with only 211 ponies under the hood.

↑ The A4 is roomier inside than before, and the cabin design is cleaner. Its dash is constructed entirely of vents.

We'll have to test it ourselves, of course, but for now, we'll say we're pleased if not overjoyed with America's primary powertrain choice.

After sampling some A4 prototypes earlier this year, we said the car "combines control, finesse, and precision into a versatile, distinctly Audi sort of driving character." All that still applies, but unfortunately, we're unable to add words like nuance, engagement, or passion to the description. Even with our test car's optional adjustable dampers set to their most aggressive mode, the handling feels rather remote.

The chief culprit is the quick, precise, but utterly dead steering. Turn-in response is surprisingly sharp, and the redesigned five-link front suspension yields high limits of grip. But the lack of at-the-limit feedback is disconcerting, as if the driver has programmed handling commands while a robot executes them. At a moderate clip, however, when ride comfort and straight-line stability are of higher importance, the A4 delivers.

Something the A4 does remarkably well is stop. With four-piston front and two-piston rear calipers, the A4's brakes bite with a crisp tactility. Much of the braking force is summoned near the top of the pedal travel, as with many clampers of Teutonic origin, yet the pedal doesn't feel like a rock on a stick; it actually travels and gives abundant feedback along the way.

Heading back toward Venice on the autostrada, we explored the sedan's demeanor at speeds up to 140 mph—some 15 mph shy of its top speed—and found it wholly unfazed. The steering remained comatose as ever, but the ride was pleasant. The car's connection to the road was unquestionable, and the lack of wind noise at those speeds bordered on the eerie.

Quick, sophisticated, and pretty, the 2017 A4 is technically proficient but short on charisma. But we expect fewer folks will be dissuaded by its lack of character than will be wooed by its *Vorsprung durch Technik*. So even if Audi raises prices when the A4 arrives this spring (there's no talk of pricing at this point), it shouldn't have much problem adding a few million more sales to the A4's 12-million-vehicle lifetime tally.



LEXUS RX350/450h

The plush and the restless. *by Joe Lorio*

Like models who want to act, actors who aspire to direct, and directors who really think they should be producers, the auto industry is restless. Take the Lexus RX. Launched here in 1998, its dossier includes a crowd-pleasing combination of virtues: plush environs, a cosseting ride, elevated seating, a modicum of versatility, and all-weather tractability. Far and away the brand's bestselling vehicle, the RX boasts "legions of repeat buyers," according to Lexus chief Mark Templin. Given that, you might think that with the all-new, fourth-generation RX, the company would be satisfied to build on the vehicle's strengths. Instead, Lexus casts an envious eye toward BMW—which, ironically, has been making its vehicles more Lexus-like of late.

Lexus wants the new RX to be seen as more youthful, more masculine, sportier, edgier. That explains the styling, a riot of acute angles and slanted creases. The grille flares dramatically down and outward, and a blacked-out section of C-pillar provides the illusion of a floating roof. Overall length is 4.7 inches greater while the wheelbase is up by 1.9 inches; width and height are about the same.

Inside, the push to add visual interest takes a more tasteful turn. Hard plastics have been almost completely banished, contrast stitching is widely employed, and a 12.3-inch center display is available with an eight-inch unit standard. The dash top is lower and the A-pillars slimmer than before, aiding forward visibility.

The hybrid again combines a 3.5-liter V-6 with two electric motors (four-wheel-drive hybrids add a third one powering the rear wheels). Estimates peg the front-drive version at 31/30 mpg, city/highway—slightly better on the highway but 1 mpg worse in city driving compared with the 2015 model. The four-wheel-drive hybrid is expected to return the same 30/28 mpg as before. Falling gas prices have dampened demand for the RX450h, but those who do go for it will find the system less hybridlike than before. Brake feel in particular is improved. Total output is up, from 295 horsepower to 308, and despite the CVT, the throttle response is fairly normal.

The mainstay engine is once again a 3.5-liter V-6. Its 295 horsepower and 267 pound-feet of torque are respectable and polished, but the RX provides no incentive to hurry. This crossover retains its heavily boosted steering, plush ride, and plentiful body motions.

Any hope for a more engaging driving experience falls to the F Sport, which is newly expanded to the hybrid. It gains credibility with the addition of adaptive dampers. Calling up their firmer setting nicely calms the ride and puts the RX on a much more even keel—and does so without adding any harshness. Unfortunately, the steering remains light and numb. Other F Sport embellishments include more-supportive seats, a new grille texture, 20-inch wheels, and much of the equipment that otherwise comes with the Premium and Luxury packages.

With its more deluxe cabin, marshmallow ride, and creamy powertrain, the fourth-generation RX builds on its existing strengths more than it establishes new ones. Not to dissuade all those restless models, actors, directors—and automakers—out there, but the lesson seems to be: Don't be too eager to walk away from what you do well.

SPECIFICATIONS

VEHICLE TYPE: front-engine, front- or 4-wheel-drive, 5-passenger, 4-door hatchback
BASE PRICE *(est)* ..... $42,000–$56,000
ENGINES: DOHC 24-valve 3.5-liter Atkinson-capable V-6, 295 hp, 267 lb-ft; DOHC 24-valve 3.5-liter Atkinson-cycle V-6, 259 hp, 247 lb-ft + AC electric motor, 165 hp (combined system, 308 hp); DOHC 24-valve 3.5-liter Atkinson-cycle V-6, 259 hp, 247 lb-ft + 2 AC electric motors, 165 hp and 67 hp (combined system, 308 hp)
TRANSMISSIONS: 8-speed automatic with manual shifting mode, CVT

DIMENSIONS

WHEELBASE ..... 109.8 in
LENGTH ..... 192.5 in
WIDTH ..... 74.6 in
HEIGHT ..... 67.7 in
PASSENGER VOLUME ..... 106–108 cu ft
CARGO VOLUME ..... 18 cu ft
CURB WEIGHT ..... 4250–4750 lb

PERFORMANCE (C/D EST)

ZERO TO 60 MPH ..... 6.9–7.2 sec
ZERO TO 100 MPH ..... 16.9–18.9 sec
1/4-MILE ..... 15.3–15.5 sec
TOP SPEED ..... 112–124 mph

FUEL ECONOMY

EPA CITY/HWY ..... 19–31/26–30 mpg





↓ The styling is radical, but the vehicle itself is not. We wonder how it will play in Peoria. Or at least at its country-club valet stands.

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JAGUAR XF

New, even if it doesn't look it. *by Tony Quiroga*

When Jaguar presented its new XF in Bilbao, Spain, recently, one of the attending reporters asked, "So, how much of the sheetmetal is new?" This is probably not a question Jaguar wanted to hear. After all, the 2016 XF is totally new, including all its sheetmetal.

The XF did look new when we initially saw it in late 2007. As the first of Jaguar's modern sedans to break free of the baroque-styling idioms of the past, the mid-size XF forced Jaguar to look forward. Since its launch, the rest of the brand has finally escaped from the 1960s. But the second-gen XF looks very similar to its predecessor, which is now just an old Jag.

Even if the XF doesn't push Jaguar's design ahead, it continues to be attractive. Put old and new next to each other and the changes are apparent. The new car's nose is blunter and more like the larger XJ's. The greenhouse is more upright, and the tail appears longer. That length is actually a visual trick, as the new XF is a fraction of an inch shorter and lower while two inches longer in wheelbase. In the wind tunnel, the car's body is slipperier, boasting a 0.26 Cd versus the old car's 0.29.

If the skin appears conservative, the platform underneath isn't. "A few screws are all that we kept," says Mike Bradley, the car's senior launch manager. The old XF's aging Ford architecture, which dated back to the Lincoln LS and the rococo Jaguar S-type, is dead. Aside from the doors, the trunklid, and the rear floor stamping, the new XF's unibody is made up of bonded and riveted aluminum castings, extrusions, and stampings. Basically, the XF's platform is an enlarged version of the new 3-series–sized Jaguar XE. But according to Jaguar, only 20 percent of the parts are shared between these two cars. Up front, the XF's suspension is an unequal-length control-arm setup modeled on the F-type's, while the rear suspension is the multilink arrangement from the XE.

For all the emphasis on weight loss, we found it odd that the doors and trunklid are steel. Saving weight by making door skins and trunklids out of aluminum is a relatively easy and obvious way to shave pounds. So why the steel? "It's done to improve weight distribution," answers Bradley. Hmm. Might also be to improve money distribution.

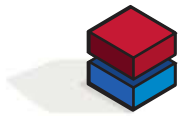
There's more steel hidden in the XF's B-pillar. Behind the aluminum, there's a high-strength steel insert that bolsters rigidity and improves side-impact crashworthiness. Other materials include magnesium castings for the front subframe and instrument-panel support. It works; the XF is solid and silent. In all, the XF's unibody is said to be 75 percent aluminum and 28 percent stiffer in torsion. In its heaviest form it will weigh about 4150 pounds, some 265 pounds less than before.

When the XF goes on sale this month, the base powertrain will be the current

XF's 3.0-liter supercharged V-6 with an eight-speed automatic. The 60-degree V-6 inhales from a twin-vortex supercharger, uses direct fuel injection, and turns out 340 horsepower and 332 pound-feet of torque. Dubbed the XF 35t, this model will start at $52,895, a price drop of about $5000 from last year's supercharged V-6.

A 380-hp version of the engine is shared with the F-type and will be available at launch. It's mechanically identical to the 340-hp version, the extra power due to zeros and ones and not any physical differences. The 380-hp V-6 will be standard in the sportier XF S, which starts at $63,695. Optional is a rear-biased four-wheel-drive system that sends power to the front wheels on demand. Equipped with a new and allegedly quieter transfer case with a chain instead of gear drive, the unit is 16 percent lighter and 10 percent more efficient, Jaguar tells us.

For the efficiency obsessed, a diesel comes in mid-2016. Producing 180 horsepower and 317 pound-feet of torque, the new 2.0-liter turbo-diesel, when cold, feels like a ringing phone set to vibrate. But once warm, the NVH offenses retreat. Acceleration is steady and the engine pulls linearly to about 4000 rpm, where oomph sharply tapers off. Diesel power may get the XF to 40 mpg on the highway, but Jaguar hasn't released official fuel-economy numbers for this engine yet. We do know that its starting price is less than $50,000.



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In addition to the diesel, we also drove 380-hp versions of the V-6 in both rear- and four-wheel-drive guises. Equipped with a balance shaft, the V-6 doesn't make much noise and rockets right past its redline toward the nearly 7000-rpm rev limiter. There's a rumble from the exhaust, but no supercharger whine. The eight-speed transmission snaps off shifts quickly and with nary a lurch. Jaguar claims a believable 5.0-second zero-to-60 time for the four-wheel-drive 380-hp V-6.

As with the exterior, the interior design of the XF is a conservative update. Side vents still open like miniature garage doors, and the shifter remains a small dial that rises when you push the start button. In the center of the dashboard is a large touch screen that features Jaguar's latest infotainment system, InControl Touch. On the standard version, each function—phone, audio, navigation, and the home screen—has a button for quick access. An optional InControl Touch Pro with greater functionality will cost extra. The Pro version features a larger screen that doesn't have buttons, but the main screen can be personalized so that frequently used functions are immediately accessible. Opting for InControl Touch Pro also replaces the mechanical gauges with a configurable TFT screen that can display several different gauge layouts as well as a large map from the navigation system.

Without a formal comparison test, and without driving a U.S. model, we're not ready to cement the XF's position in the mid-size-luxury realm. Body control is excellent, and the XF feels smaller and lighter than Audis, Benzes, and BMWs in its class. However, even equipped with the 380-hp six, it's not as athletic as the Cadillac CTS Vsport. The XF's electric power steering lacks the dogged alertness of the Cadillac's, though it's not too far off. It does have a better interior than the Cadillac, and the Jag's engine is smoother but not as powerful as the CTS's 420-hp V-6. But these are just the first new XFs. More-powerful V-8s are undoubtedly in the works. They should silence concerns about the conservative sheetmetal.

SPECIFICATIONS

VEHICLE TYPE: front-engine, rear- or 4-wheel-drive, 5-passenger, 4-door sedan
BASE PRICE *(est)* ..... $49,000–$66,695
ENGINES: turbocharged and intercooled DOHC 16-valve 2.0-liter diesel inline-4, 180 hp, 317 lb-ft; supercharged and intercooled DOHC 24-valve 3.0-liter V-6, 340 or 380 hp, 332 lb-ft
TRANSMISSION: 8-speed automatic with manual shifting mode

DIMENSIONS

WHEELBASE ..... 116.5 in
LENGTH ..... 195.0 in
WIDTH ..... 74.0 in
HEIGHT ..... 57.4 in
CARGO VOLUME ..... 19 cu ft
CURB WEIGHT ..... 4000–4150 lb

PERFORMANCE (C/D EST)

ZERO TO 60 MPH ..... 4.8–7.0 sec
ZERO TO 100 MPH ..... 11.8–20.6 sec
1/4-MILE ..... 13.3–15.5 sec
TOP SPEED ..... 120–155 mph

FUEL ECONOMY (C/D EST)

EPA CITY/HWY ..... 19–30/29–41 mpg

↓ It looks like the old XF on the outside, but on the inside, it looks more like the old XF. And we thought these days were behind Jag.







LAND ROVER RANGE ROVER Td6

This $90,000, two-and-a-half-ton SUV is sensible and modest, at least in one respect. *by Mike Duff*

Some good news for Scrooge McDuck: Buy a Range Rover Td6 and nobody needs to know about your miserly habits. Its turbo-diesel engine is marked by nothing more than a tiny badge, and even if you stand next to the tailpipe with the engine idling, you will hear only the sort of subdued thrum a modern direct-injected gasoline-powered engine might produce.

The Range Rover Td6 and its diesel-drinking Range Rover Sport sister come a full 25 years after the first oil-burning Rangies were offered in Europe, but are the company's first compression-ignition models on this side of the Atlantic. The engine, though new to us, is a long-serving 3.0-liter turbo-diesel V-6 that can trace its origins to a long-forgotten joint venture between Ford and Peugeot-Citroën. It's been cleansed to pass U.S. emissions with urea treatment from an onboard tank of "diesel exhaust fluid," claimed to be good for 10,000 miles between refills. This federal version produces 254 horsepower and 440 pound-feet, the latter available from just 1750 rpm. Economy is claimed to be 29 mpg highway, a 26-percent improvement over the supercharged gas V-6.

The Td6 never feels like a poor man's choice. From inside the cabin, you won't hear any of the tinkling harmonics often associated with diesel power. During aggressive acceleration, there's the sort of distant mechanical noise you might pick up from the stateroom of your luxury yacht after ordering the captain to make haste. Performance is similarly unobtrusive. There's an adequate sufficiency at all times, but not enough to deliver much in the way of excitement. It's best to ride the torque tsunami and let the eight-speed automatic do its thing. Request sudden acceleration and there's a noticeable pause as the trans works out how many gears to kick down and the turbo spools up.

It's definitely not a revver. Despite the marked 4800-rpm redline, it won't go above 4000 rpm except in its overridden "command shift" manual mode. But the claimed 7.4-second zero-to-60 time puts it in close proximity to its gasoline-fed sister.

The rest of the driving experience is essentially identical to that of the existing Range Rover, with a supremely pliant ride and a driving position that feels lofty enough to let you issue orders to a Mongol horde. Guided by overly light power steering, the chassis delivers impressive accuracy when called upon to do so, and you can hustle the Td6 at a decent pace if you choose, although at the cost of some prodigious lean angles. Both it and any passengers aboard are happiest when traveling at a more regal pace, leaving all that nouveau SUV dynamism to the Range Rover Sport.

For a $1500 supplement over the gasoline six, it's not hard to see the Td6's appeal, especially as its extra fuel economy doesn't call for any obvious sacrifices. This is a diesel that's equally attractive to heart and head.

▼ SPECIFICATIONS

VEHICLE TYPE: front-engine, 4-wheel-drive, 5-passenger, 4-door hatchback
BASE PRICE $87,445
ENGINE TYPE: turbocharged and intercooled DOHC 24-valve diesel V-6, iron block and aluminum heads, direct fuel injection
DISPLACEMENT ..... 183 cu in, 2993 cc
POWER ..... 254 hp @ 3500 rpm
TORQUE ..... 440 lb-ft @ 1750 rpm
TRANSMISSION: 8-speed automatic with manual shifting mode

DIMENSIONS
WHEELBASE ..... 115.0 in
LENGTH ..... 196.8 in
WIDTH ..... 78.1 in
HEIGHT ..... 72.6 in
PASSENGER VOLUME ..... 113 cu ft
CARGO VOLUME ..... 32 cu ft
CURB WEIGHT ..... 5250 lb

PERFORMANCE (C/D EST)
ZERO TO 60 MPH ..... 7.4 sec
ZERO TO 100 MPH ..... 20.1 sec
1/4-MILE ..... 15.8 sec
TOP SPEED ..... 130 mph

FUEL ECONOMY
EPA CITY/HWY ..... 22/29 mpg





↓ The 3.0-liter turbocharged diesel V-6 doesn't make the Range Rover quick or increase its towing capacity, but it does deliver good fuel economy for a barge so large.



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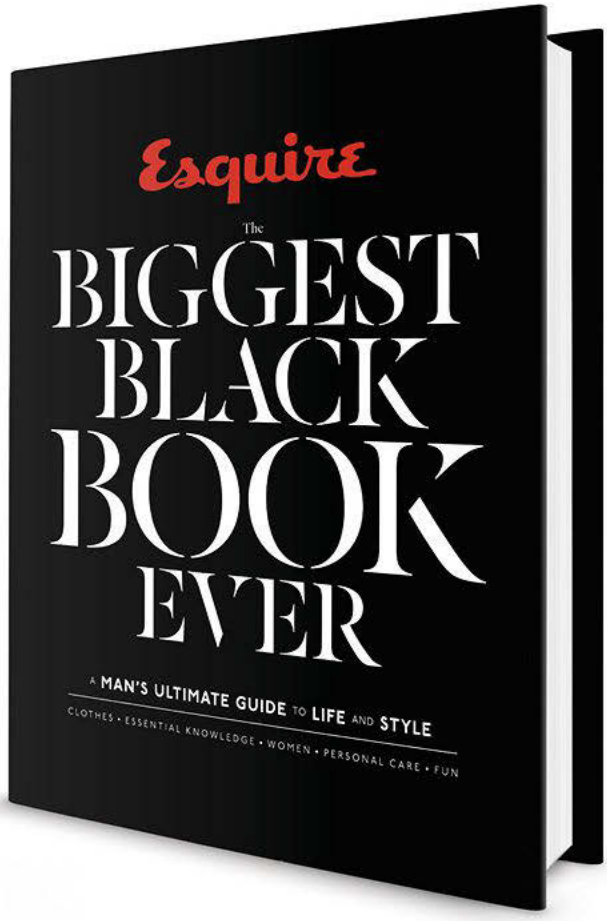
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edited by TONY QUIROGA

EDITOR QUOTE: *"We could only drive them about 100 miles over two days without risking a long walk."* — EV COMPARO, MARCH 2014

SECOND-HAND ELECTRICS



ELECTRIFYING BARGAINS

ELECTRIC VEHICLES HIT THE USED-CAR MARKET, HARD. *by Aaron Robinson*

You need an extra car, maybe for a teenager or a spouse returning to work, or an elderly parent who lives at home. This car won't go on long trips and you don't want to pay a lot, but you also don't want a hooptie headache with a bad transmission or a blown head gasket. Your answer may be a used electric vehicle.

Thanks to government regulation that forces automakers to dump electric cars on the market, there are some, er, shockingly good deals out there on used electric vehicles. If you wouldn't mind paying $7000 for a mint 2012-model four-door hatchback showing just 3200 miles, read on.

Electric vehicles hit the market in significant numbers starting with the 2011 Nissan Leaf. Though the demand for pure electrics remains quite small, finding an inexpensive, low-mileage used one is not difficult. A recent nationwide search on the popular shopping website Cars.com turned up 294 used plug-in EVs priced at $10,000 or less. The oldest was a 2011 Nissan Leaf with about 15,000 miles for $9999. The cheapest was a 2012 Mitsubishi i-MiEV with 10,000 miles for $5985.

EVs aren't for everyone, which is why they're so cheap. Depending on the battery's size and age, the cars can only go 50 to 100 miles on a charge. Plus, buyers of used EVs aren't eligible for the federal tax credit offered to new-vehicle customers. However, most people drive fewer miles daily than the range of a typical EV (a customer survey says that Chevy Volt owners drive 41 miles daily on average), and "fueling" an EV is less expensive than filling a gasoline or diesel vehicle. Charge at night, when electricity rates can be lower, and it may cost as little as two cents a mile compared with 12 cents or so for a 30-mpg gasoline car. Plus, the EV will never need an oil change or tune-up.

If all that sounds good, maybe you're ready to go electric. We've profiled three used EVs that sell for less than $10,000. Prices vary and it pays to shop around, even if you must have the car shipped.

EDITOR QUOTE: *"Utility that amounts to 'cars with one-gallon gas tanks that take five hours to fill.' Why do they even exist?"* — EV COMPARO, MARCH 2014



▲ MITSUBISHI i-MiEV

WHAT IT IS: An electrified version of Mitsubishi's odd little Japanese-market i mini-car.

BATTERY CAPACITY AND NORMAL RANGE: 16 kWh, 50–70 miles

PROS: Tiny on the outside, big on the inside; easy to park and garage; ridiculously small turning circle; heated driver's seat, auto-temp air conditioning standard.

CONS: Wee battery pack, small-car ride, nonadjustable steering column, hardly luxurious.

BUYING TIP: SE Premium models have aluminum wheels, navigation, Bluetooth, and a quick charger, but they're rare, while the raspberry paint color is rampant.



▲ NISSAN LEAF

WHAT IT IS: Nissan's bold venture into mass-market EVs produced this friendly and fairly normal four-door hatchback.

BATTERY CAPACITY AND NORMAL RANGE: 24 kWh, 60–90 miles

PROS: Quiet and soft, nav system has a charge-station finder and clever range displays, many available from early adopters moving to BMW i3s and Teslas.

CONS: Baggy styling, not much fun, one of the heavier EVs at up to 3400 pounds, some have a slower 3.3-kWh charger, battery degradation can be an issue.

BUYING TIP: Best value is an SL with the quick-charge port, which can provide an 80-percent charge in 30 minutes.



▲ SMART FORTWO ED

WHAT IT IS: An electric version of Smart's two-seat city buggy.

BATTERY CAPACITY AND NORMAL RANGE: 17.6 kWh, 50–75 miles

PROS: Parks in your pocket, the lightest EV at around 2100 pounds, you don't have to worry about your teenager taking lots of friends along, it drives better than the gas-powered Smart.

CONS: Slow steering, weird handling, not many EV driving aids in the gauges or the navigation system, governed at 78 mph.

BUYING TIP: The Smart Fortwo ED Cabriolet is the only electric convertible besides the Tesla Roadster. So, you'll have that going for you.

IT'S ALL ABOUT THE BATTERY.

The two things potential EV buyers worry about are range and the longevity of the lithium-ion battery pack, which can cost thousands to replace. Luckily, almost every used EV on the market is still covered by its eight-year/100,000-mile factory battery warranty, which means the pack will be replaced if its performance declines.

Meanwhile, there are ways to put off the battery's demise. First, buy a car with low miles. Second, look for cars from more-temperate climates, as Phoenix's summer heat and North Dakota's cold can shorten the pack's life. A Carfax report will tell you where the car was sold new and where it was serviced, as well as if it suffered a collision.

Judging from forum chatter, most EVs run happily for years and to well over 50,000 miles without losing any appreciable range. You can stretch the pack's life further by following the charging tips in your owner's manual, such as minimizing the number of times you plug in with more than a half charge.

Smartphone apps such as caniOn for the Mitsubishi i-MiEV and Leaf Spy for the Nissan Leaf communicate with your car via a Bluetooth transmitter (about $35) plugged into your OBD II port. They help you monitor and maintain the battery pack and diagnose trouble.

As hybrids took off, a few companies got into pack repair, a less expensive alternative to outright replacement. No doubt such services will be available to EV owners once more of them are on the road. Should you need a complete replacement, a Nissan Leaf battery costs about $6000 installed. If you score a good deal on a used Leaf, even if you have to replace the pack a few years down the road, you may still come out ahead over a conventionally powered beater bought for the same price. —*AR*

SMART ED PHOTOGRAPHY BY MARC URBANO

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EDITOR QUOTE: *"Craigslist has transformed the classifieds from a relaxing Sunday idyll into an endless 24/7 spew of commerce, which, in some poor saps, incites a neurotic tendency toward compulsive, habitual browsing."* — C/D, DECEMBER 2010



KICKED TO THE CURB

AVOID BEING "CURBSTONED" WITH OUR HANDY GUIDE.

by Paul Duchene

There's a shadowy world of car selling that makes the scumbags of Kurt Russell's 1980 comedy, *Used Cars*, look like poster boys for the Better Business Bureau. "Curbstoners" are individuals who pose as private sellers to gain the confidence of a prospective buyer. Sometimes they're dealers who pose as car owners to more easily dispose of undesirable stock. But the definition can also apply to people who sell enough cars to qualify as a dealer but never register as one in order to avoid the costs and the resulting paper trail. Either way, curbstoners aren't who they appear to be, since they don't usually own the car they are selling. By keeping their names off the title, they can leave you in the lurch when, for example, you find out your new purchase can't be registered. Without a name, the curbstoner slips off into the ether with your money.

Called curbstoners because they sell their wares on curbs, as a private seller would, these people typically deal in cars that have troubled pasts. Salvage titles, odometer rollbacks, cars that won't pass inspections, flood-damaged cars, and even stolen cars can be flipped onto unsuspecting buyers who believe the seller's untruths. "It's a great car, I've had it for years," they might say. "But with a baby on the way, I have no use for it."

A curbstoned car will almost often have some issue with its title. To avoid being scammed, only buy a car from a seller whose name is on the title. Before handing over the cash, ask to see the seller's driver's license and make sure it exactly matches the title. If the person you're dealing with tells you he's representing the seller, find out why, and then be sure to get the seller's contact information and arrange to meet with that person. If a car has multiple names on the title, as can happen in marriage, watch both of the listed owners sign. If the title is already signed, meet with the sellers to make sure they're the ones who signed the title.

Any paperwork issues that exist when the buyer goes to register the car quickly become the buyer's problem. Perhaps there's a messy divorce, or the seller is dead and somebody else signed the title before the estate was settled, or the name on the title is that of a Nigerian prince. All are problems you inherit if you buy the car. Doesn't pass smog or other state inspections? Your problem. To help mitigate any trouble you may encounter, and to get any necessary legal recourse, you must be able to find and contact the owners of record.

Curbstoners will have an answer for every question. Posing as caring owners, they can engender enough confidence that the buyer will fall for any story. They can be hard to distinguish from trustworthy private sellers, so, as always, buyer beware.

YOU MAY ALREADY BE A CURBSTONER

by John Pearley Huffman

California's Department of Motor Vehicles isn't screwing around. "Selling a vehicle can put a person in violation of the law and subject to criminal prosecution," an agency spokesman tells *C/D*. That's even if you never tamper with an odometer, misrepresent ownership of a vehicle, or otherwise half-assedly cobble together some junk to sell as safe-and-sound machinery. In California, if you sell even one car for a profit you fall under the definition of a dealer as described in Section 285 of the state's Vehicle Code. And if you are not excluded amid the word salad in Section 286, you need a license. Without a license, or the requirements demanded by it such as dealer insurance, you're a curbstoner.

Laws vary from state to state, of course. But used-car-dealer lobbying groups are powerful across the country, and they're all too eager to clamp down on curbstoners who threaten their retail business.

In April 2014, California's DMV Investigations Division (yes, they're armed) cracked down on curbstoners across the state, issuing 93 citations, impounding 109 vehicles, and arresting four individuals. This past August, Florida's Palm Beach County passed new regulations allowing law enforcement to tow vehicles from improvised used-car lots. And it doesn't take much Googling to find recent anti-curbstoning activity in areas ranging from Texas to Wisconsin.

"We receive complaints and focus on proactive investigations for internet sites and physical locations," the California DMV representative explains. So selling a single rehabilitated project car seems unlikely to attract the law's attention. But if there's a question at all in your mind whether you're a dealer, the spokesperson recommends contacting the DMV. Here at *C/D*, we'd call a lawyer.

illustration by **DARCY MUENCHRATH**

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57294843

SUPER COUPON

FREE

WITH ANY PURCHASE

1" x 25 FT. TAPE MEASURE

PITTSBURGH

LOT 69030/69031
69080 shown



$6.99 VALUE

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57283789

SUPER COUPON

NEW

900 PEAK/ 700 RUNNING WATTS 2 HP (63 CC) 2 CYCLE GAS RECREATIONAL GENERATOR

LOT 60338/66619/69381 shown

Customer Rating



SAVE $68

$99.99

comp at $168.97

57275708

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SUPER COUPON

27 LED PORTABLE WORKLIGHT/FLASHLIGHT

LOT 67227 shown
69567/60566/62532

Customer Rating



SAVE 58%

$2.99

comp at $7.15

Batteries included.

57242637

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WOW SUPER COUPON

RAPID PUMP® 1.5 TON ALUMINUM RACING JACK

PITTSBURGH

LOT 69252/60569 shown
68053/62160
62496/62516

- 3-1/2 Pumps Lifts Most Vehicles
- Weighs 32 lbs.

Customer Rating



$59.99 ~~$89.99~~

SAVE $60

comp at $119.99

57258216

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SUPER COUPON

3 TON HEAVY DUTY STEEL JACK STANDS

PITTSBURGH AUTOMOTIVE

Customer Rating



SAVE 42%

LOT 61196
38846 shown
69597/62392

$19.99

comp at $34.99

57269014

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WOW SUPER COUPON

44", 13 DRAWER INDUSTRIAL QUALITY ROLLER CABINET

LOT 62744/69387
62270/68784 shown



SAVE $660

US GENERAL

- Weighs 245 lbs.

Customer Rating

$369.99 ~~$389.99~~

comp at $1029.99

57292005

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SUPER COUPON

9 PIECE FULLY POLISHED COMBINATION WRENCH SETS

PITTSBURGH

SAE
LOT 69043/42304 shown

METRIC
LOT 42305/69044

Customer Rating



SAVE 66%

YOUR CHOICE

$5.99

comp at $17.97

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WOW SUPER COUPON

12 VOLT, 10/2/50 AMP BATTERY CHARGER/ ENGINE STARTER

CENTECH

LOT 66783/60581
62334/60653 shown



SAVE 57%

$29.99 ~~$49.99~~

Customer Rating

comp at $69.99

57265484

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SUPER COUPON

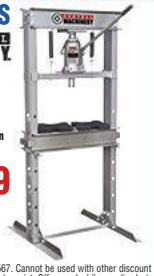
20 TON SHOP PRESS

CENTRAL MACHINERY

Customer Rating

- Pair of Arbor Plates included

LOT 32879/60603 shown



SAVE $215

$154.99

comp at $369.99

57251173

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WOW SUPER COUPON

2.5 HP, 21 GALLON 125 PSI VERTICAL AIR COMPRESSOR

CENTRALPNEUMATIC

LOT 69091/67847 shown
61454/61693/62803

Customer Rating



SAVE $349

$149.81 ~~$179.99~~

comp at $499

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SUPER COUPON

ADJUSTABLE SHADE AUTO-DARKENING WELDING HELMET

CHICAGO ELECTRIC WELDING

LOT 61611
46092 shown

Customer Rating



SAVE 50%

$39.99

comp at $79.99

57270496

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SUPER COUPON

VEHICLE POSITIONING WHEEL DOLLY

- 1250 lb. Capacity

LOT 61917 shown
67287/62234

PITTSBURGH AUTOMOTIVE

Customer Rating



NEW

SAVE $200

$69.99

comp at $269.99

57275949

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SUPER COUPON

1500 WATT DUAL TEMPERATURE HEAT GUN (572°/1112°)

drillmaster

LOT 96289 shown
62340/62546

Customer Rating



SAVE 70%

$8.99

comp at $29.97

57281255

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ACCIDENT PRONE

HOW TO UNCOVER THE MISHAPS IN YOUR USED CAR'S PAST. *by John Pearley Huffman*

The trouble with wrecked cars isn't that they can't be fixed, it's that many of them are fixed badly. Recognizing lousy repairs can be the difference between buying a solid used car or getting stuck with a pile of problems. And even if the repair is done well, vehicles with accidents in their history can be less desirable and are often worth less than uncrashed cars in the market, so uncovering damage before paying top dollar is crucial.

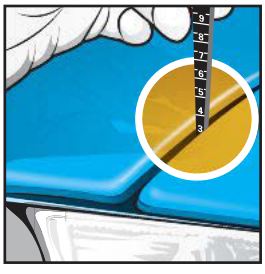
"The first thing to do is stand back," explains Adam Johnson, the restoration manager at Canepa Design, a classic-car emporium in Northern California. "Look for where the paint doesn't quite match." Make sure the car is clean when you inspect it, and move around the car and look for slight variations in paint gloss or awkward reflections. But also get informed and know what you're observing. "On some Porsches, like the slant-nose 911s, the paint didn't match from the factory," adds Johnson.

To more accurately determine a car's paint history, you'll need an electronic paint meter. Using magnetic, eddy-current, or ultrasonic principles, these gauges can indicate where paint work has been done, as indicated by increased paint thickness. These gauges aren't cheap—some can run more than $700—but good ones can be had for $250 or less.

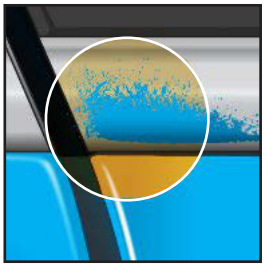
"Even ordinary used cars can be $20,000," Johnson explains. "So a paint meter isn't expensive compared to that."

Sometimes too good a job can be a giveaway. "Always be leery of a really nice undercoat job," says Johnson, who has 22 years of experience in paint and body work. "That could be covering something up."

Too perfect is rare, however. Be realistic. "All we want to see is a correct repair," Johnson concludes. "We make sure you can't tell. That's the whole point of restoration."



▲ **FITNESS REPORT**
Body-panel fit is usually the most obvious giveaway that a car has been haphazardly repaired. Gaps between panels should be tight and consistent.



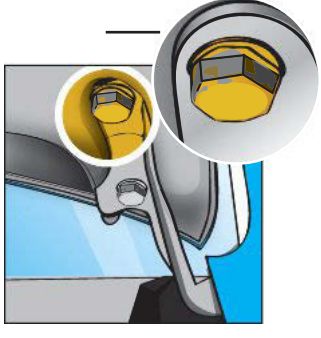
▲ **EYELINER**
Inspect the inner fenders for signs of telltale overspray. Overspray is always an indication of sloppy paint work, but so are drips, dust, runs, and inconsistent "orange peel," or texture, in the paint. Any of these can mean that the vehicle was painted on the cheap, in a less-than-perfectly-clean environment, or not allowed to cure correctly. Use your fingers to feel inside fender lips for pulled or hammered metal marks, which indicate that the wheel wells have been worked on. Use a flashlight to look at inner fenders here, too, for signs of folds.



▲ **STICK IT TO 'EM**
Emission stickers, equipment labels, and other not-easily-replaceable tags should all be present and in their original locations. Some cars such as BMWs have "hidden" VIN stickers on most body panels. Missing stickers can indicate a replacement panel. Obviously new parts, sometimes used for reasons such as sun damage on one headlight and not the other, can also point to accident damage.



▲ **BADGE NUMBER**
Be sure to check the location of the trunklid badges. Repair shops can get the location wrong, so check your car against others.



▲ **CHASING BOLT**
Hoods, decklids, and fenders are often bolted to a car before paint is applied. Look for non-matching nuts and bolts, or ones with scraped-off paint, or even ones with no paint on them at all. This can indicate that the panels have been replaced or repaired.

illustrations by **PETE SUCHESKI**

JUST THE CARFAX

Carfax has so effectively marketed itself that some used-car dealers now preemptively offer these vehicle-history reports before a customer asks for it. But the reports have their limitations.

Carfax gathers its information using databases from state motor-vehicle departments, used-car auctions, insurance companies, dealers, body shops, and other sources. But not all accidents are reported and not all incidents result in an insurance claim.

Carfax's own disclaimer explains its limitations: "Other information about this vehicle, including problems, may not have been reported to Carfax."

That said, having a Carfax report never hurts as it can also point to odometer inconsistencies and hidden damage from events such as floods. If a car has a clean report, it's not a bad start. —JPH

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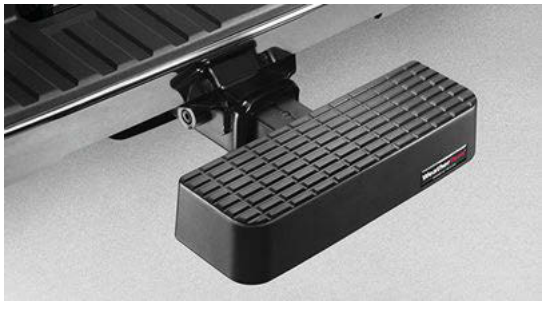
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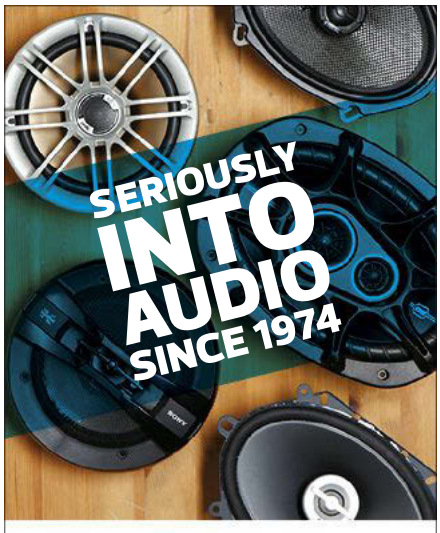
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LAMBORGHINI JALPA

1982–88 **Unveiled at the 1981 Geneva auto show,** the Jalpa entered production for 1982. Developed from the two-seat Silhouette and four-seat Urraco that preceded it, the Jalpa added hard angles and fender flares to fit in with its big brother, the Countach. As the entry-level Lambo, the Jalpa featured a 255-hp 3.5-liter V-8 instead of the Countach's V-12. With Countach prices going through the roof lately, this is a good time to give the Jalpa a second look. Its design, rarity (only 410 were produced), and wonderful V-8 are the ingredients of a future classic. — *JAMES TATE*



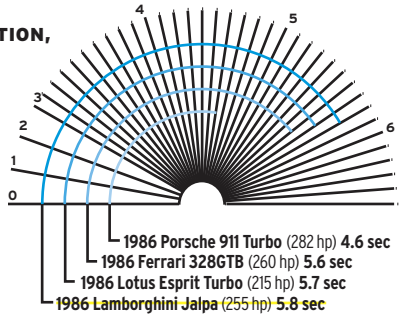
BODY: One problem area for the Jalpa is rust, specifically in the fenders that help give the car its distinct origami envelope. Water pools in certain fender-well areas. Over time and miles, the moisture aggravated by stone and debris impact results in corrosion.





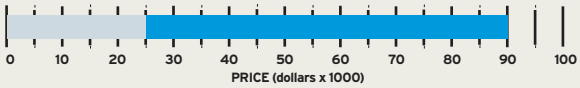
BRAKES: Thanks to a lack of cooling ducts, Jalpa brakes will overheat. Not "tend to" or "may;" they *will* overheat. Owners can either configure their own brake vents to cool them, or, you know, not drive too fast.

0–60-MPH ACCELERATION, SECONDS:
C/D test results.



ESTIMATED USED-VALUE RANGE*
According to Eric Lawrence, editor of the *Black Book/CPI Collectible Vehicle Value Guide*: "The current market on Jalpas runs from about $25,000 on the low side to $90,000 for a very nice car. Typical cars are around $50,000. I'd give a slight edge to the later cars that featured bumpers and other trim in body color, as opposed to black on the earlier ones. The vintage-exotic market is on fire right now, and as most of the true classics have skyrocketed out of reach, many collectors are moving down to the second-tier models. For example, Ferrari 308/328s have dramatically increased in value in the past year. Countachs, especially the early cars, are going crazy, and even Diablos are making pretty big gains. If I had to make a prediction, I'd say that the Jalpas have a pretty bright future, at least in the short term."

1982–1988: $25,000–$90,000



ESTIMATED REPAIR COSTS:

	PARTS	LABOR
Engine-mount bracket	$150	$450
Wheel (each)	$2500	–
Engine gaskets	$900	$300
Clutch replacement	$1500	$2900
Tires (set of four)	$400–$650	$80–$100
Brake rotors and pads (front and rear)	$900	$600

*Values provided by *Black Book* (BlackBookUSA.com).

***ENGINE:* 3.5-LITER DOHC V-8**
255 HP @ 7000 RPM
230 LB-FT @ 3250 RPM
***REDLINE:* 7500 RPM**
***0–60-MPH ACCELERATION:* 5.8 SEC**
***QUARTER-MILE:* 14.5 SEC @ 93 MPH**
C/D test results from June 1986.

ENGINE: Check for blue smoke, indicating oil entering the combustion chambers via worn valve seals. On early U.S.-spec models, sealed airboxes make changing spark plugs very difficult, generally requiring engine removal. An access panel was added to later models as a fix. The engine is actually quite solid, thanks in part to its use of a timing chain in lieu of the fragile belts found on the earlier Urraco's V-8. Engine mounts are a weak point. Carried over from the less-powerful Urraco, the brackets tend to fail on the torquier Jalpa.

ASK AN OWNER: JOHN Y., CALIFORNIA

(1983 LAMBORGHINI JALPA, 52,195 MILES)

C/D: How long have you owned yours?
JY: About 30 years.
C/D: Any issues?
JY: Maintenance-wise, it's pretty good—as long as you've got a good mechanic.
C/D: Are parts available? Anything really expensive?
JY: Well, most of the parts are available, especially now that the factory is supporting all the older cars. I've waited a few months sometimes for a part to come in, but general availability is better than it's been in a long time. The front-suspension parts, if you want to go original, are thousands of dollars.
C/D: Any common mods, for durability or usability's sake?
JY: Yeah, there are some. When we rebuilt the engine, the mechanics bored out some of the oil ports to improve lubrication after discussing it with some authorities who said it was better for the bearings. Engine mounts are a weak spot. Since beefier ones are available, I upgraded.
C/D: Any online communities you can recommend?
JY: I'm a member of the Lamborghini Club of America. There's also a forum called the Vintage Lamborghini Garage (vintagelamborghini.com). It's a good information source for the older cars.

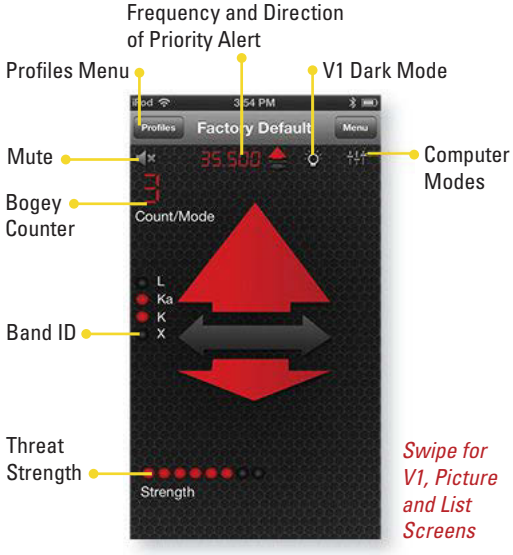
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